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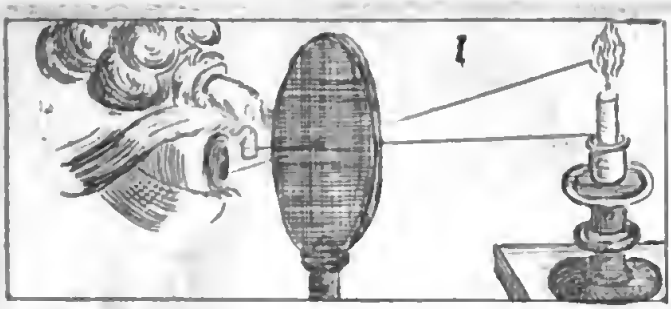
EXPERIMENTA CIRCA VISIONEM.

Apparatus. Præpara laminas chartaceas eius propè magnitudinis, quam refert fig. 1. tubos etiam longos 3, aut 4 pollices, imò & vnum 3, aut 4 pedum; tum laminas alias acicula perfora vno foramine, alias duobus, aut pluribus, dum illa simul non occupent spatium pupilla maius, tuborum verò laminam vnam perfora vno foramine, aliam verò duobus, aut pluribus.

Experimenta. 1. fig. 1. Laminam perforatam propiùs oculo admoue; intuere fenestram, aut candelam. Si chartam sensim interponas à dextris oculum inter & laminam, illa teget sinistram obiecti partem, & contra. *Exp.* 2.3. fig. 2.3. Aciculam oculo propiùs admoue: illa apparebit maxima, confusa, & quasi transparens, adeò vt nullam distantis rei partem abscondat; ac si chartam oculum inter & aciculam inferas à dextris, videbitur acicula minui à sinistris. *Exp.* 5 6.7.8.9.10.11.12. fig. 5.6.7.8.9.10.11.12. Laminam duorum, aut 3 foraminum propiùs oculo admoue. intuere in signum aliquod illuminatum, putà vel punctum, aut characterem in charta, vt exp. 5. 8. 11: vel foramen factum in alia lamina, vt exp. 6.7: ac tunc signum visum apparebit vel multiplicatum, vt 5.8: vel maius, vt 9.11: vel apparebunt plura foramina in remotiori lamina, vt 6.7: vel apparebunt signa, & foramina inuerso situ, vt 5. 6. vel si chartam oculum inter & laminam inferas à dextris, illa teget sinistrum signum, aut foramen apparens, vt 8: vel signum videbitur nigrius, & coloratius in medio, vt 9.11: vel si loco perforatæ laminæ chartam admoueris obliquè ante oculum, habeásque è regione signum aliquod lucidum, illud apparebit geminum, vt 12: vel denique si tubo vtaris longiori foramen apparebit multiplicatum, sed eodem situ, & admota prope oculum charta à dextris teget dextrum foramen apparens. *Exp.* 10. fig. 10. Suspende globulum, aut pone caput aciculæ iuxta tuum oculum, deinde intuere in faces accensas, aut quod fiet commodiùs, intuere in laminam perforatam multis foraminibus, & expositam luci, aut fenestræ, & modicè ab oculo distantem 3 aut 4 pollicibus; tunc apparebunt tibi tot globuli, aut aciculæ, quot erunt faces, vel in lamina foramina, ac videbuntur aciculæ inuerso situ. Porrò laminas perforatas, & tubos poteris inter se vario modo committere, & experiri iucunda plurima & admiranda, vt ipsa te docebit experientia.

Consectaria. 1 Species diuersorum obiectorum, vt candelæ & candelabri ita feruntur in oculum rectis radiis, vt illi decussent sese in aëre ante oculum, vt 1. exper. 2 Pars oculi, in qua visio exercetur, habet aliquam extensionem, eámque maiorem pupilla, vt 2.3. exper. 3 Eadem obiecta aliter videntur, si sint propiùs, nempe confusa, & maxima, vt 3. exp. vel etiam euerso situ, & multiplicata, vt 5.6.7.10. exp. aliter si sint in iusta distantia, scilicet distincta, vt vulgò fit, cùm legimus; aliter si remotiora, nempe confusa, remissa, & eodem situ, vt longioribus in tubis. 4 Idem obiectum variis radiis in oculum penetrat, & afficit varias visiuæ potentiæ partes aliquando, aliquando vnicam, cùm videatur aliquando multiplex, aliquando vnicum, experim. 2. 3. 5. 6. &c.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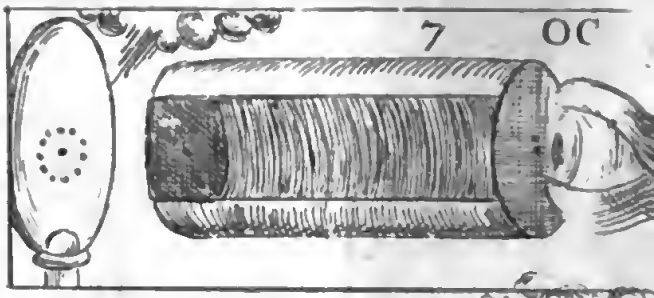
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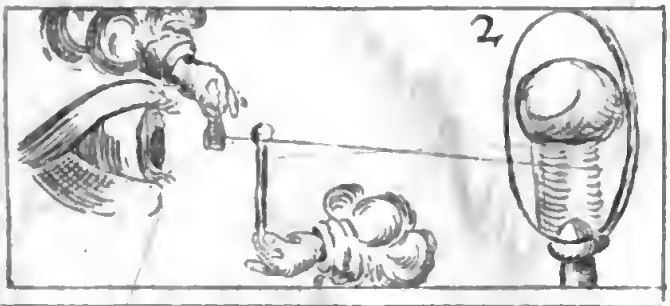
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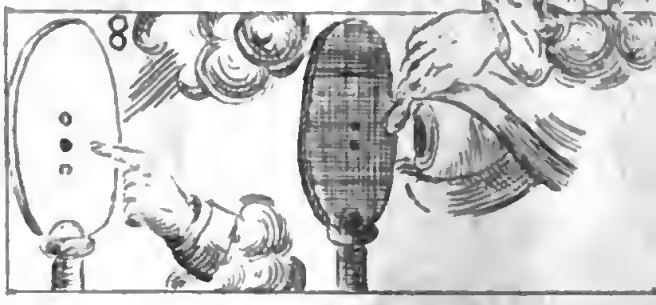
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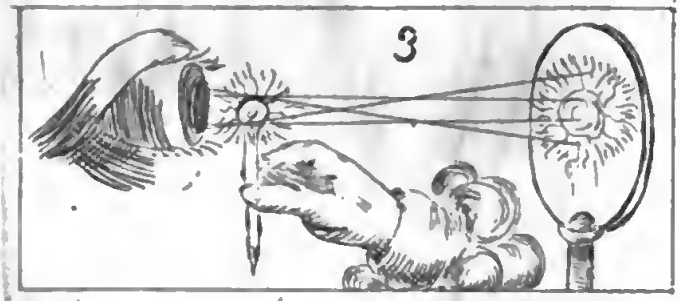
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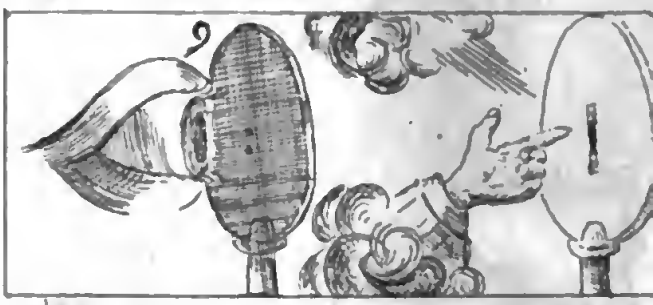
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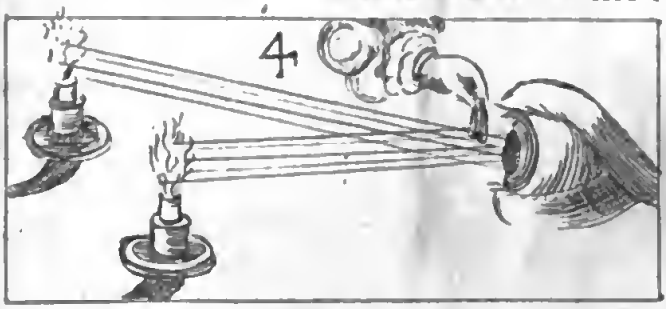
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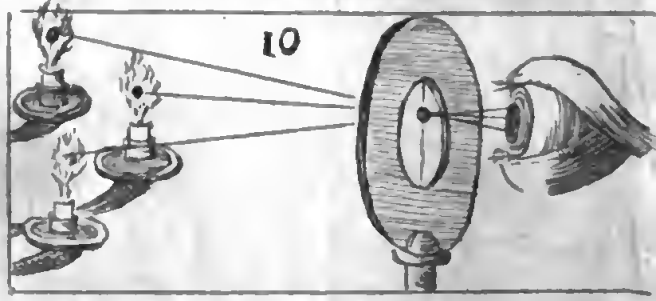
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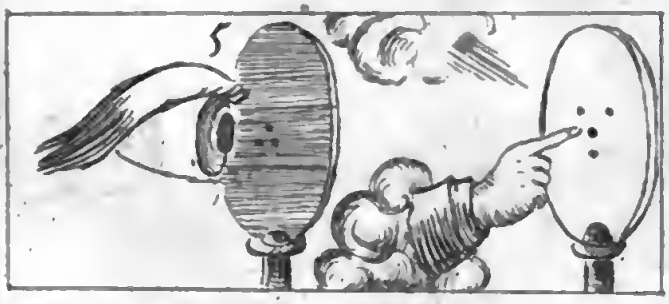
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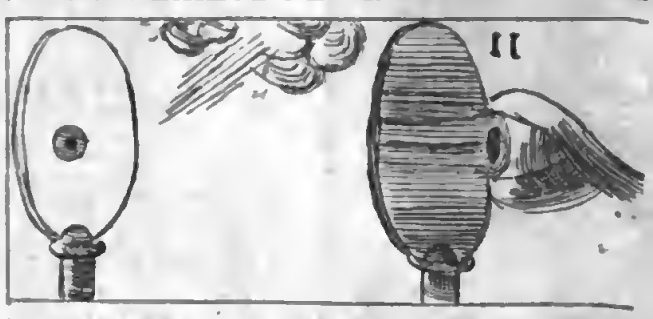
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Boudan excud. Cum Priuil. Regis.

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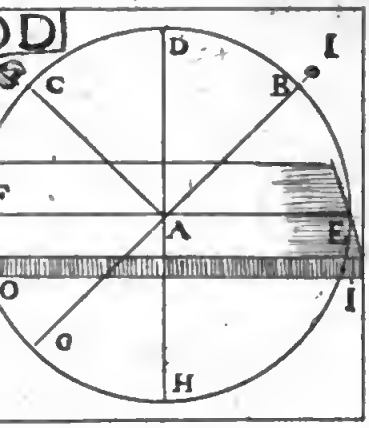

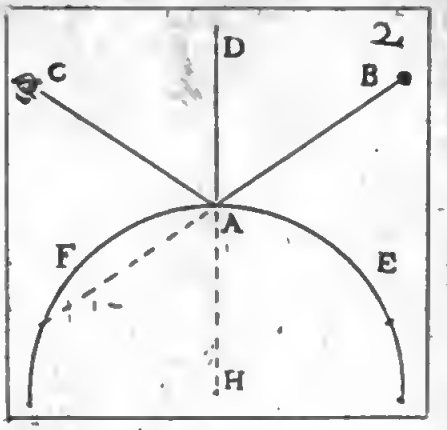

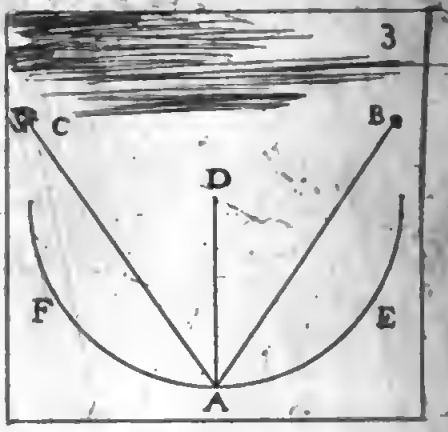

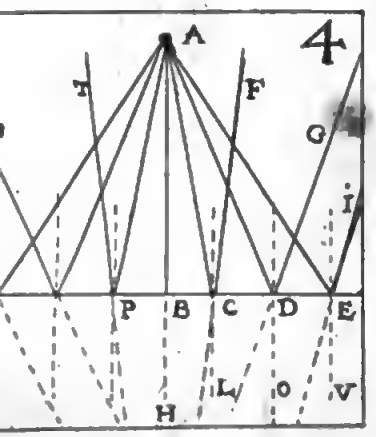

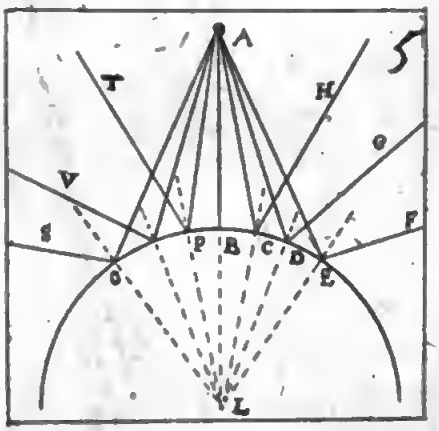

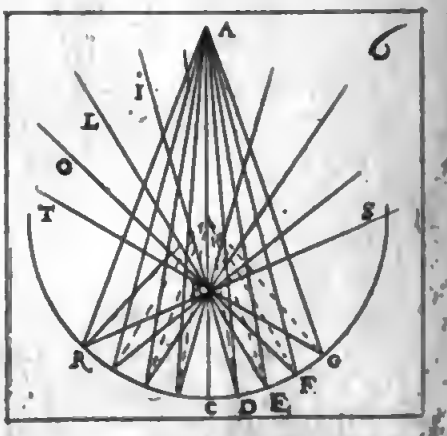

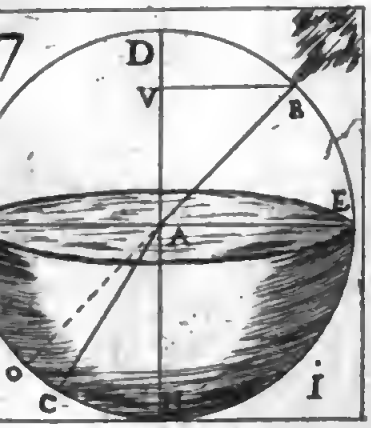

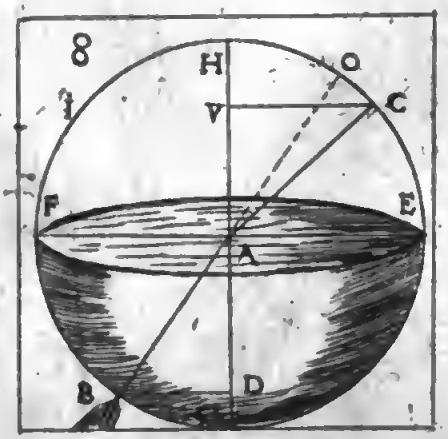

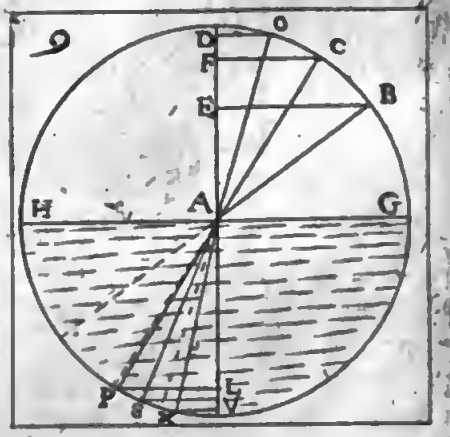

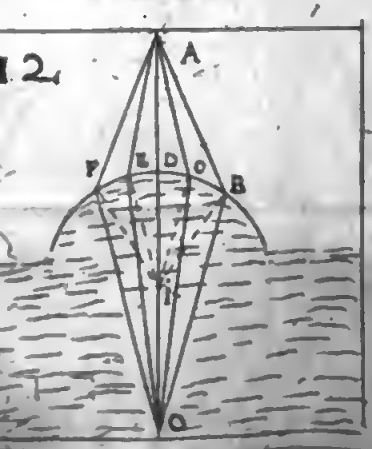

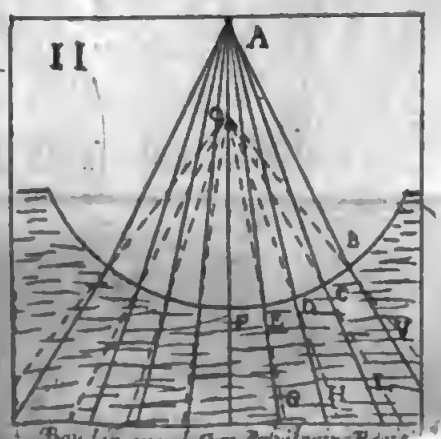

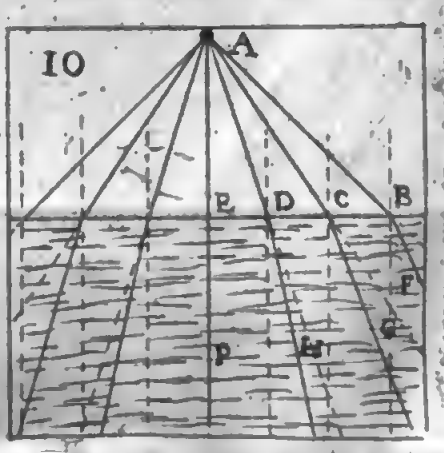

Boudin excud. Cum Petitprain Rémi

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Complectitur ille munia præcipuarum oculi partium, atque aperit, quo pacto pingantur obiecta ſuas per ſpecies in retina.

Pupilla. Duplex illius munus. 1 Nimiam lucem arcere, & ſuperfluas ſpecies. hinc fig. 1. acceſſu facis pupilla coarctatur, receſſu dilatatur, & fig. 2. oculus intendens in obiectum vicinum pupillam conſtringit. 2. Ita ſpecies in oculum admittere, vt ſingulæ in ſingulis retinæ partibus ferantur, torúmque obiectum pingatur ſine confuſione. Id verò intelligitur commodè exemplo ſimilium rerum. Etenim fig. 3. vt clauſo in conclaui res foris poſitæ inſinuant ſe ſe per paruum foramen, ac pinguntur in charta foramini oppoſita euerſo ſitu: ita per pupillam res feruntur in oculum & in retina pinguntur. Præterea fig. 4. vt pictura, quæ dicto in conclaui repræſentaretur magna, & in longa diſtantia, contrahitur beneficio lentis Chryſtallinæ, ita propter Chryſtallinum poſitum prope pupillam imagines rerum viſarum, & illarum diſtantia conſtringuntur. Denique fig. 5. vt dicto in conclaui ſol aut obiectum rotundum inſinuans ſe ſe per foramen triangulare, aut quadratum repræſentatur rotundus, ſuámque retinet figuram, atque fig. 6. vt ſol pingitur rotundus per tubos Hollandicos licèt foramen ſit paruum, aut magnum, aut triangulare: ita licèt pupilla ſit rotunda, res obiectæ oculo repræſentantur in retina ſecundùm propriam figuram. *Chryſtallinus* radios omnes ab eodem puncto per pupillam intrantes frangit, colligit, & in vnum retinæ punctum deſtinat hoc pacto fig. 7. A puncto A multi radij in pupillam feruntur facientes pyramidem viſualem, aut penicillum exteriorem: Hos excipit Chryſtallinus, & propter figuram, quam habet, frangit, & dirigit in punctum retinæ I, fitque ea ratione vt penicillus exterior mutetur in interiorem ſiue refractum, idémque punctum A pingatur multis radiis in eadem retinæ parte. Idem fit circa puncta B, & C, & alia quæuis, adeò vt totum obiectum pingatur dum pars in parte proportionali repræſentatur. *Proceſſus ciliares.* Hi, vt Chryſtallinum ſuſpendunt filis quibuſdam ad inſtar aranei, ita globoſitatem aptam illi tribuunt conſtringendo, aut laxando fila, atque adeò augendo vel minuendo penicillum interiorem, ita vt apex illius in retinam accuratè pertinear; ſecus vt idem punctum pingetur in diuerſis retinæ partibus, ita viſio erit confuſa. fig. 8. 10. 12. 13. Hæ verò ſunt leges conformandi Chryſtallini. Chryſtallinus iuſtæ formæ iuſtum facit penicillum ex iuſta diſtantia 9. ex minori iuſta, maiorem 8. ex maiori iuſta, minorem 10. Hinc regula. Accedente obiecto augetur penicillus, recedente minuitur. Rurſum ex communi diſtantia Chryſtallinus iuſtæ formæ iuſtum facit penicillum 11. Planior, longiorem 12: globoſior, breuiorem 13. Hinc regula. Chryſtallinus planior obiectum poſcit remotius 14. globoſior vicinius 15. Hæc verò & quæ ſuperiùs dicta ſunt probantur tum experientia in artefacto, & naturali oculo, tum ratione ex legibus refractionum, tum denique ex oculi compoſitione, quem alio modo componimus vt legamus remota, alio vt vicina, nempe vt hoc & illo modo Chryſtallinum conformemus.

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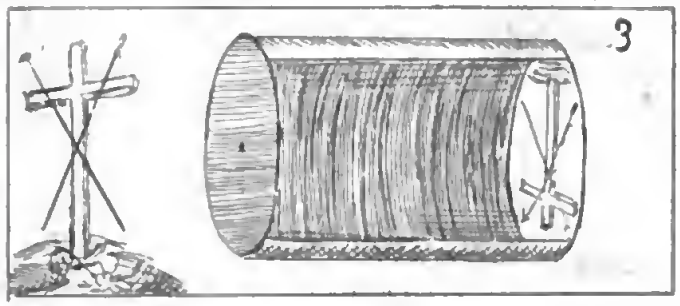

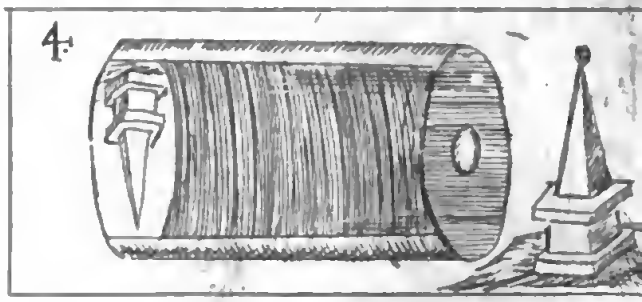

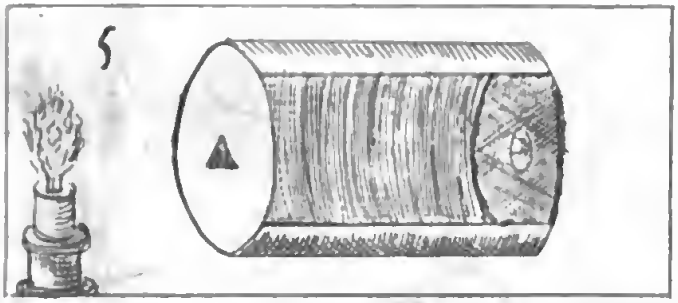

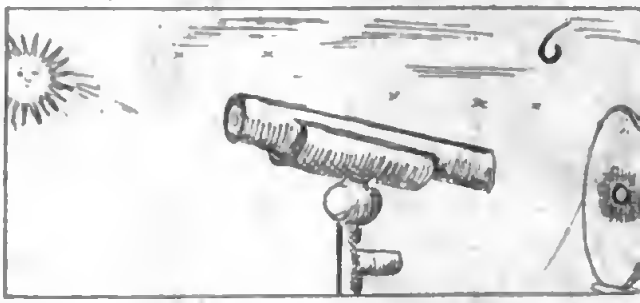

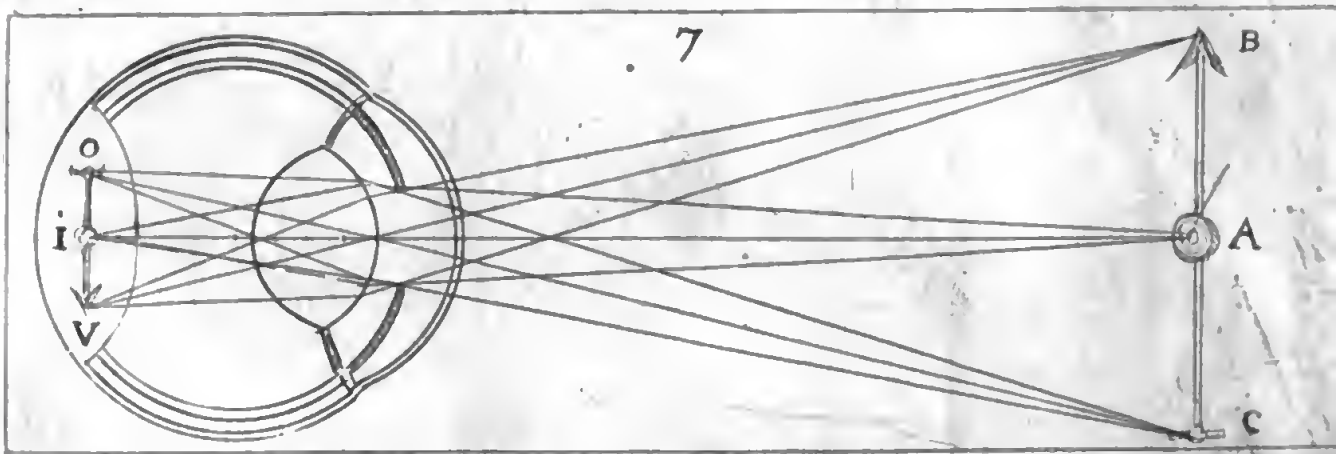

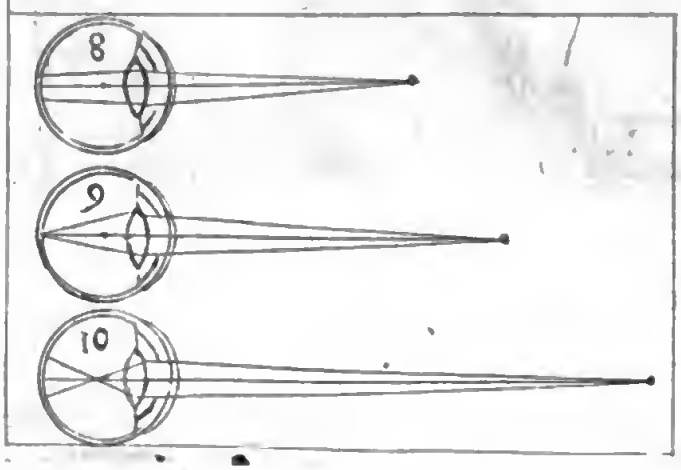

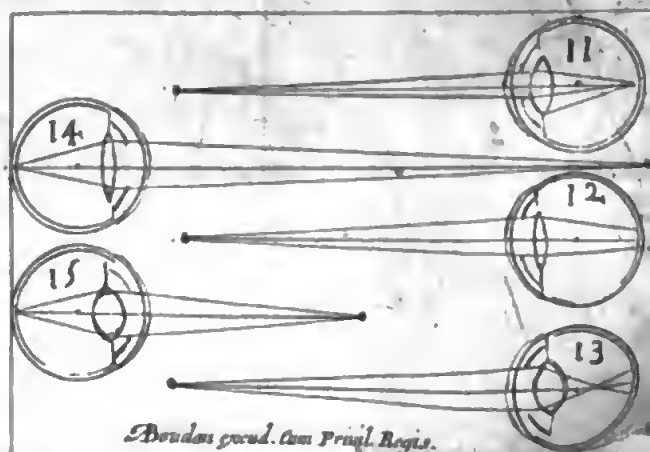

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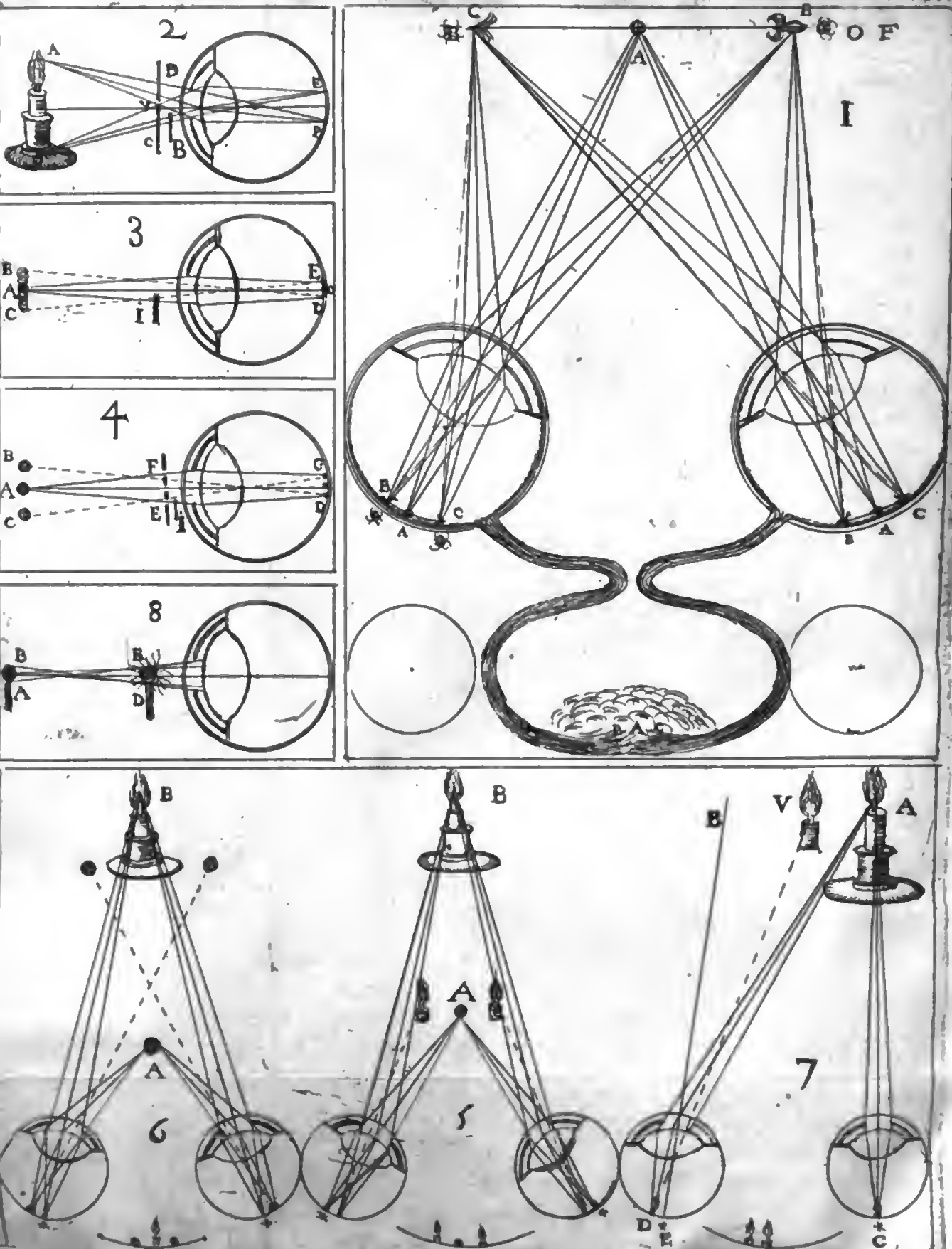
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Absoluta visio continet actionem oculi, & interni sensus in cerebro, ac peragitur hunc in modum. Species obiectorum transmissæ in retinam offendunt, neruos opticos, ex quibus retina componitur. fig. 1. hi vt pleni sunt spiritibus visorus, adeóque contenti, pulsum aut motum, quem à speciebus accipiunt, communicant, cerebro vnde oriuntur (siue id fiat, motu neruulorum, siue ope speciei subtilioris per eos transmissæ, sine per sympathiam) ea ratione, & ordine, vt neruuli mediæ retinæ afficiant mediam cerebri partem, neruuli dextræ dextram &c. adeò vt partes retinæ vtriusque pares attingant eandem partem cerebri. AAA, BBB &c. Eum in modum fœcundato sensu externo & interno anima per cerebrum, pérque oculum apprehendit obiectum extra, & aínte oculum diametraliter, siue secundùm lineam, quæ si realis esset, duceretur à retina perpendiculariter per illius centrum, adeò vt situs quem obiecta perdiderant intrando oculum, recuperetur actione, & apprehensione oculi ob retinæ curuitatem, & quem euerterant radij immissi, emissi restituant. Hinc

Leges visionis. 1. Quæ directè ante oculum sunt posita, ea feruntur in oculum per radium primarium, qui axis opticus appellatur, & pinguntur in medio retinæ, siue centro axis, & quæ sunt supra axem pinguntur infra; quæ infra, supra &c. fig. 1. AA, BB. 2. Quæ pinguntur in centro axis, ea afficiunt centrum cerebri; quæ in dextra vtriusuis retinæ, dextram cerebri, &c. AAA, BBB. 3. Quæ afficiunt centrum cerebri, aut sensus, ea apprehenduntur ante oculum secundùm axem opticum; quæ dextram sensus partem, ea apprehenduntur ad sinistram axis, &c. AAA, BBB. 4. Quæ pinguntur in pari parte retinarum, ea afficiunt eandem cerebri partem, & apprehenduntur eodem in loco; quæ verò in disparibus, ea afficiunt dispares cerebri partes, & apprehenduntur in locis diuersis, ac disparibus. Hinc

Explicata phænomena. Primum fig. 2. Lamina intercipit omnes radios præter duos, qui ad foramen V decussantur. ergo lamina B inferior intercipiet radium superioris obiecti A. Secundum, & 3. fig. 3. A propter iniustam distantiam pingitur multoties in EOD, & eadem acicula A apparet confusè in BAC. ergo lamina inferior I impedit apparentiam superiorem B. Videtur verò acicula transparens eo, quia non impedit ne obiecta pone illam posita ferantur in alias, fig. 8. retinæ partes per pupillam acicula maiorem, adeóque videantur. Quintum, 6, 7, &c. fig. 4. Signum A iusto vicinius pingitur per foramina F, & E in G, D excluſis radiis aliis, & apparet in B, C. ergo lamina inferior I impediet apparentiam superiorem B. Phænomena verò duorum oculorum, quibus interdum idem obiectum duplex apparet, sic se habent. fig 5. Axes intendunt in A: pingitur B in sinistra dextri, & dextra sinistri, adeóque in dextra & sinistra sensus interni, & apparet hinc, & inde. fig. 6. Axes intendunt in B: pingitur A ad dextram dextri, & sinistram sinistri, & apparet geminum. Fig. 7. Axes duo CA, EB non conueniunt, siue quod oculus alter DE digito detorquetur, siue ob neruorum fatigationem, ergo A pingetur in centro axis C, & in dextra dextri D, & apparebit duobus in locis.

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Visionis est percipere, & subiicere æstimatiuæ potentiæ ea, quæ sunt aspectabilia. Sunt verò Aspectabilia, vel Propria, quæ solo oculo percipiuntur, vt Lux, & Color, vel Communia, quæ non solo oculo, nec per propriam speciem, vt Regio, siue Pars, Distantia, locus, vnitas, multiplicitas, quies, motus, situs, magnitudo, figura, & similia; vel denique Media, quæ solo quidem oculo, sed non per propriam speciem, vt Perspicuitas, opacitas, vmbra, tenebræ, similitudo, & alia id genus. Lux videtur per lumen, & color per speciem tanquam per imagines, adeò vt color cæruleus videatur, v. g. quòd species in oculo recepta sit intentionaliter cærulea, & cæruleam faciat retinam. Communia verò, & Media sentiuntur per species lucis, & coloris hoc, & illo modo dispositas, dum æstimatiua potentia, & imaginatio per talem & talem speciem tali & tali ratione modificatam apprehendit vsu & experientia hoc aut illud coloratum, vel lucidum, & illius tantam distantiam, talem figuram, magnitudinem, & similia, hoc modo.

Regio, aut pars dextra, sinistra, superior, inferior, &c. noscitur ex motu oculi in dextram, aut sinistram, &c. vel ex specie in tali, aut tali retinæ parte. *Distantia* percipitur dum vsu, & experientia tactus, aut motus localis deprehendimus rem tali & tali modo repræsentatam in oculo distare ab eodem, & quidem plus, aut minus, prout exhibetur sub tali magnitudine, distinctione, confusione, splendore, obscuritate, adhibita etiam relatione ad eandem rem, vel ad alias antea cognitas. Præterea ex compositione oculi, qui aliter & aliter se disponit ad videndum distinctè ex tali aut tali distantia, maximè verò ex motu, & inclinatione duorum oculorum ad inuicem. Ita fig. 1. oculi B, G minus inclinantur, vt videant A; plus, vt videant D. Ita figura 2. alia est configuratio oculi, ac chrystallini A, vt videat B; alia, vt C. *Locus* sentitur ex cognita regione, & distantia. fig. 3. qui nouit D esse in tali regione BD, & habere in ea distantiam B D, nouit quoque illud esse in D. *Vnitas* ex vnica specie in oculo. *Multiplicitas* ex multiplici. fig. 4. A videtur geminum, aut duobus in locis F, G ob duas species D, E. *Magnitudo* tum quòd species tantam retinæ partem imbuat tanta ex distantia, tum quòd tanto oculi motu sit perlustrandum obiectum, tum ex relatione ad alia. *Figura*, tum quòd hæc retinæ pars, non illa pingatur, tum quòd aliæ partes picturæ sint lucidiores, aliæ obscuriores, &c. Fig. 5. oculus globum apprehendit quòd species in retina sit circularis, & lucidior in medio, idémque sentiendum fig. 6. de profundis rebus, aut eminentibus. *Situs* ex cognito partium loco. *Motus* ex specie in retinæ partibus variis successiuè producta. *Quies* ex eiusdem constantia. *Transparentia*, quòd duæ species in eadem retinæ parte duo repræsentent obiecta in eadem regione, hoc in hac, illud in illa distantia, adeò vt vnum vltra alterum videatur. fig. 7. Globus vltra planum vitreum. *Opacitas* ex contrario transparentiæ. *Vmbra* ex minus lucida specie in retina. fig. 8. *Tenebræ* ex nulla specie in retina, dum sibi imaginatio fingit aliquid maximè luci oppositum. *Similitudo* ex simili specie in retina, &c.

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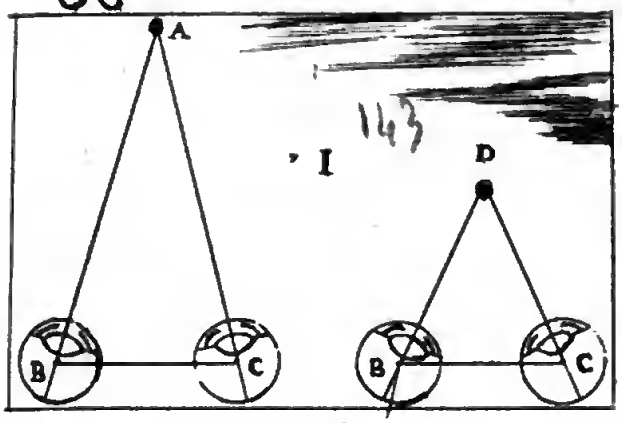

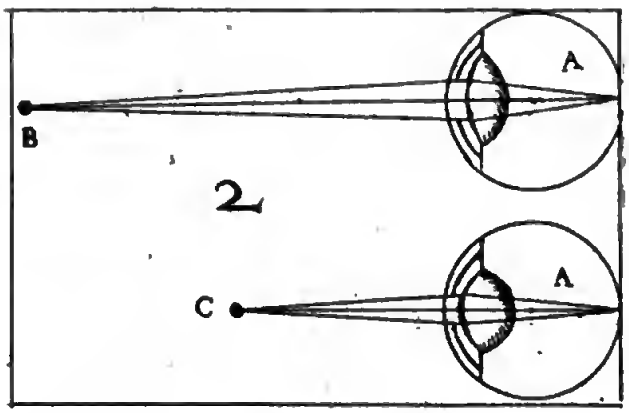

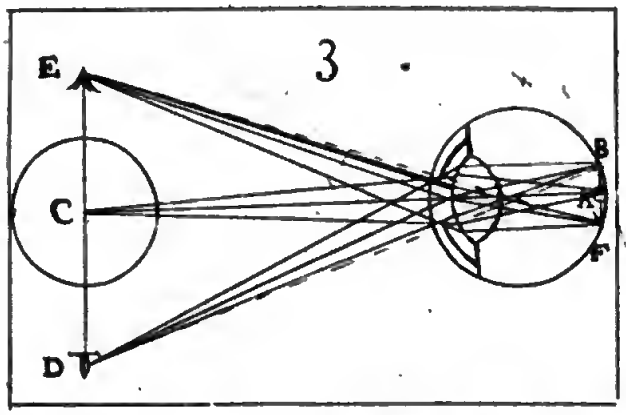

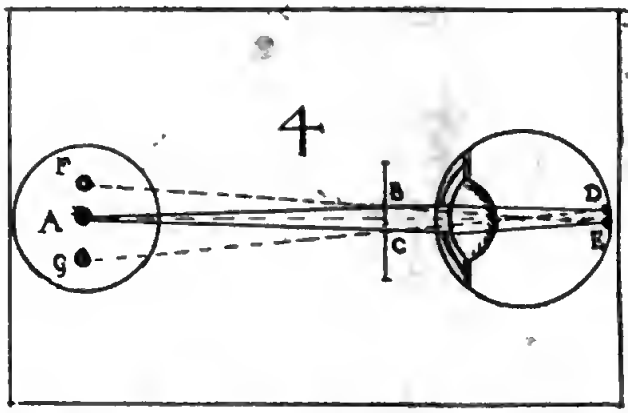

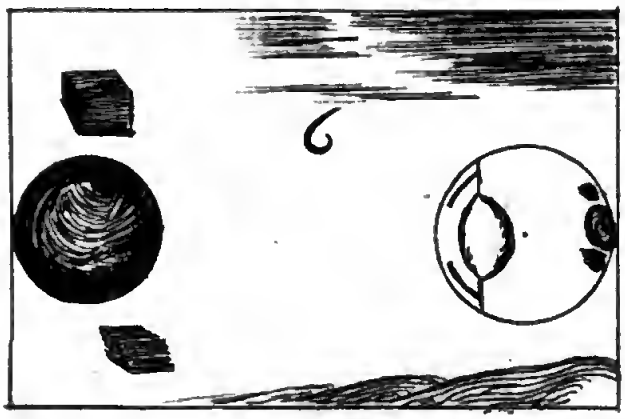

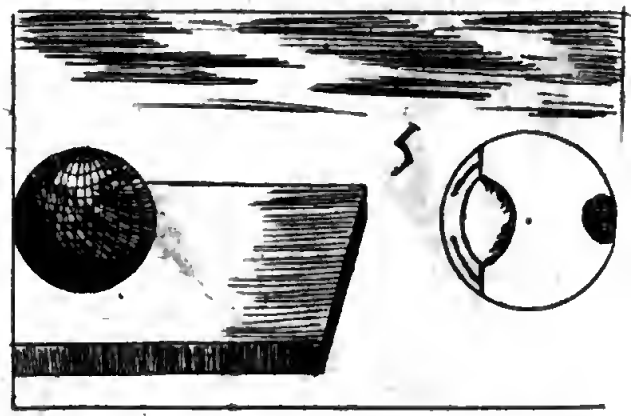

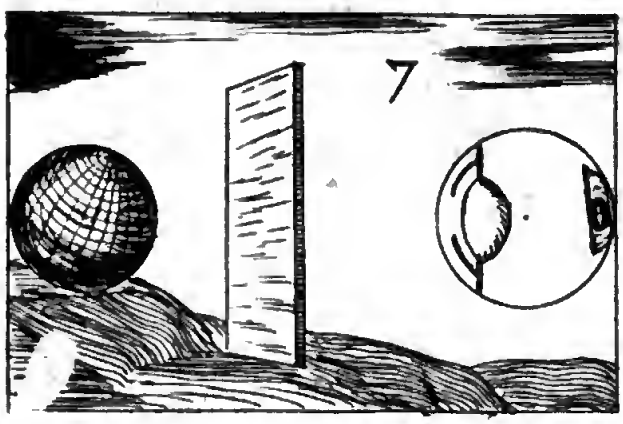

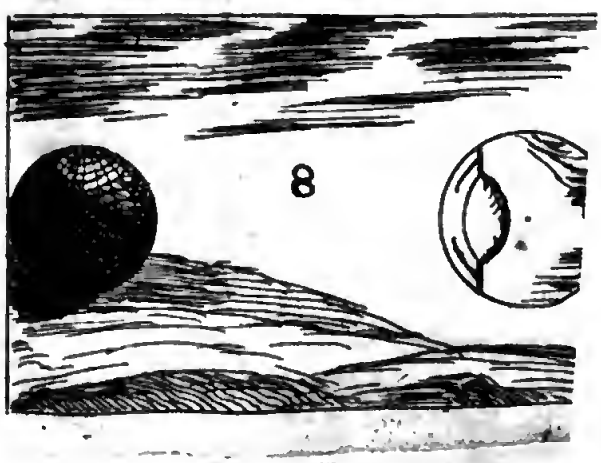

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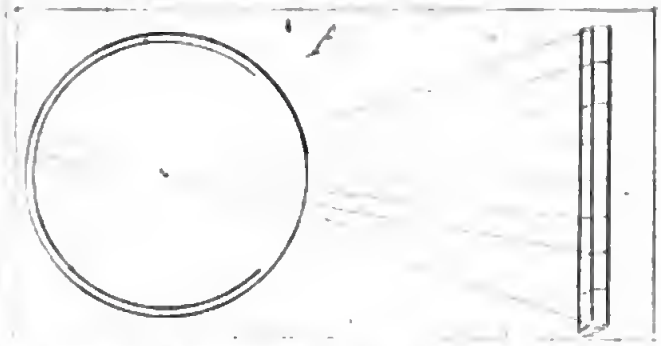

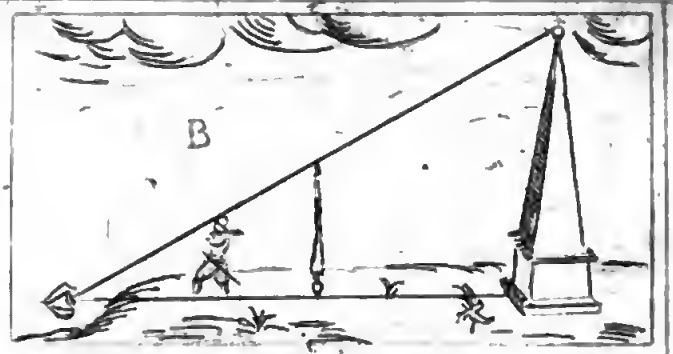

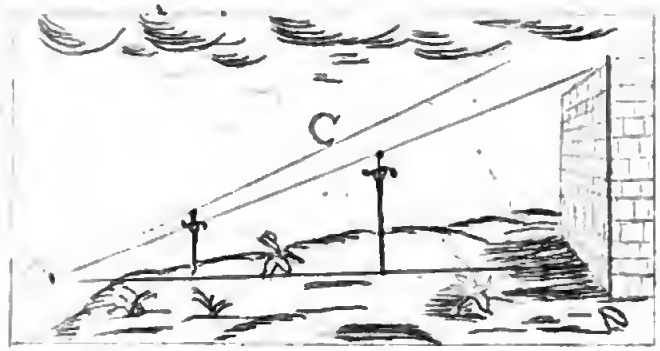

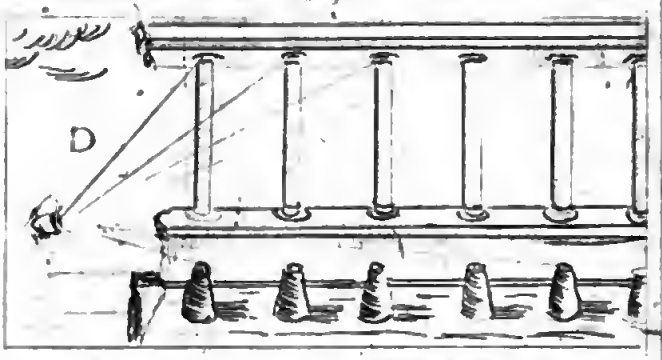

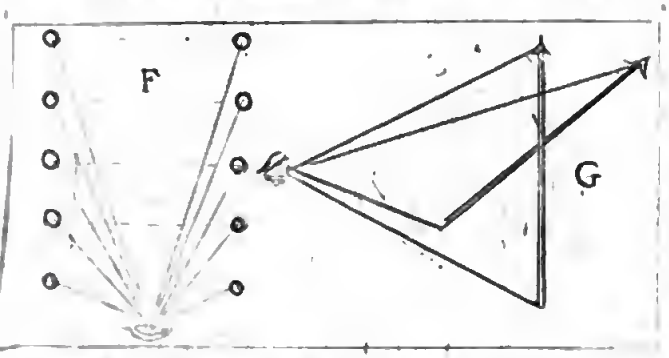

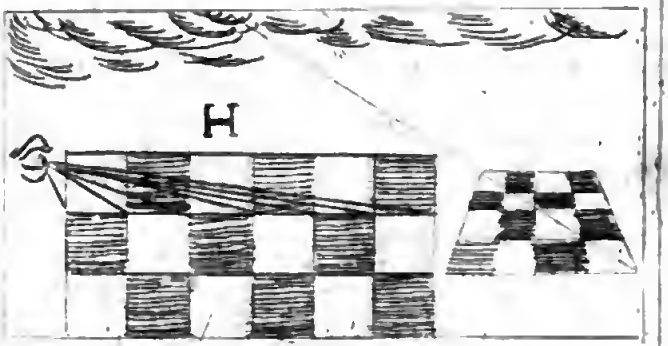

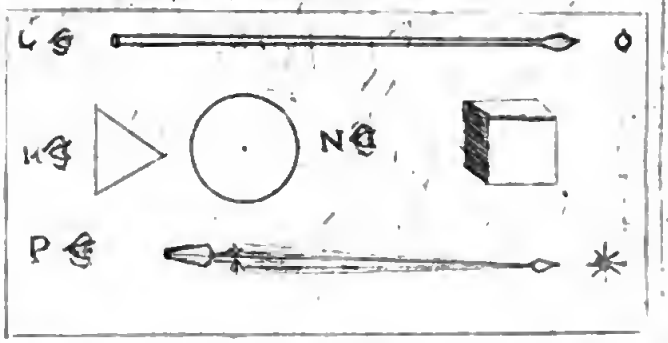

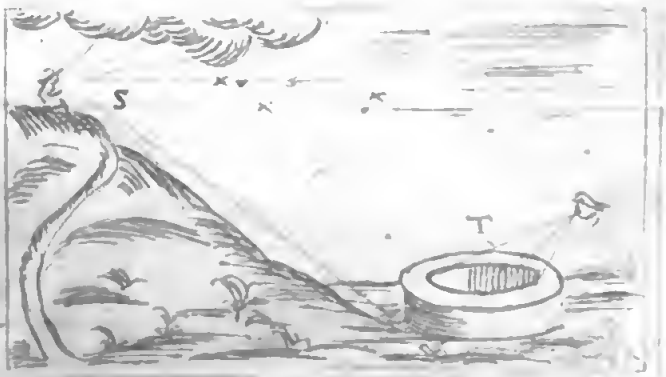

Boudan Cum Privilegio Regis.

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Directa appellatur illa visio, quæ perficitur rectis radiis in fundum oculi irrumpentibus. Quare cùm solus axis opticus sit rectus, ac perueniat ad medium retinæ sine vlla refractione, componitur directa visio ex multis axibus, ac fieri intelligitur dum oculus mediam retinam conuertit ad obiecti partes singulas, eásque lustrans axes opticos circumfert, & colligit. Ita legendo paginam, lineas syllabatim percurrimus. Ita laterculo A oculus trabem successiuè lustrat. Hinc directæ visionis hæc propria. 1 Supponit oculi motum circa suum centrum in omnem partem. 2 non est tota simul, sed fit successiuè pars post partem. 3 Axes illius omnes, vt ad centrum oculi confluunt, ita in eo sese secant, & pyramidem successiuè constituunt, cuius apex est in centro oculi, basis in obiecto A. 4 Inter axes ij sunt altiores, ad quos habendos oculus mouetur sursum; idem de depressis, sinistris, &c.

Principia. 1 Quidquid videtur, sub aliqua pyramide optica videtur A: id est ita videtur, vt opticam pyramidem efficiat. 2 Quidquid videtur, sub aliquo angulo videtur A, B. Nempe sub eo, qui fit in apice pyramidis A. 3 Quæ videntur congruere, videntur æqualia: hoc est neque excedere, neque excedi. 4 Æqualia ex æquali distantia, & eodem modo posita, videntur æqualia. 5 Quæ videntur æqualia iis, quæ visa sunt æqualia, videntur quoque inter se æqualia. 6 Quod videtur secundùm suam partem aliquam æquale alteri, videtur secundùm aliam partem, illud excedere. 7 Ea sunt altiora respectu oculi, & sentiuntur, ac videntur altiora, ad quæ videnda oculus mouetur sursum, idémque de depressis, dextris, & sinistris. 8 Quæ videntur per axes altiores, videntur altiora, &c. Atque illa quidem omnia sic videntur, nisi aliæ sint cognitiones, quibus æstimatio corrigatur.

Theoremata. 1 Quæ videntur sub eodem, aut sub æquali angulo, videntur æqualia. B Lancea pyramidi, & I Musca equo. Nempè videntur congruere. 2 Quæ videntur sub maiori angulo, videntur maiora, & contrà. C Pugionis lamina ensi videtur æqualis, adeóque pugio ensem superare toto capulo. 3 Æqualium obiectorum illud, quod videtur sub duplo maiori angulo, videtur duplo maius. D prima columna videtur duplo maior, quàm quarta. 4 Æqualium obiectorum ea, quæ propiora sunt, videntur maiora, & contrà D, H, R. 5 Item quæ videntur directè, maiora videntur spectatis obliquè G: nempe sub maiori angulo. imò L Sarissa videri potest, vt circulus: M Triangulum, aut circulus, vt linea: P lancea, vt stella. 6 Æqualium obiectorum positorum supra oculum ea, quæ sunt propiora, videntur altiora. D columnę remotæ videntur depressiores: nempe per axem depressiorem. Infra verò oculum quæ propiora, videntur inferiora, & contrà. D Metæ remotæ, altiores visæ. Denique ad dextram oculi, quæ propiora sunt, videntur magis dextra, & contrà, idémque de sinistris F. Hinc in porticibus R laqueare videtur deprimi, attolli pauimentum, dextra & sinistra versus medium ferri; S intuenti vallem illa videtur altior vicino vertice, & T fundum putei altius vicino margine, nisi aliunde æstimatio corrigatur.

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Ex ſolenni canone Angulus reflexionis æqualis eſt angulo incidentiæ, Speculum planum ita reflectit, & repræſentat obiectum totum, vt ſingula illius puncta. Eo verò modo quodlibet punctum reflectit, quo punctum ipſum ferretur in oculum, ſi ſpeculum abeſſet, & eſſet oculus ex aduerſo: ſimiliter ita punctum repræſentat, vt ab oculo videretur, ſi abeſſet ſpeculum, & punctum eſſet ex aduerſo. fig. 1. A reſilit in C per EF, vt rectà ferretur in B. Item C videt A per EF, perinde ac ſi A eſſet in D. hinc ea quæ ſequuntur præſtat ſpeculum planum.

1 *Dextra ſiniſtris permutat.* fig. 2. Dexter oculus A videtur in B: eſt autem B, ſiniſter propterea quòd facies apparens opponatur viſæ. 2 *Euertit.* fig. 3. 4. A per horizontale ſpeculum videtur in B, & quidem euerſum, quod occurſu ſpeculi radij incidentiæ inferiores fiant in reflexione ſuperiores, & contra CD inferior, mutatur in ſuperiorem DE &c. Idem fit in ſpeculo ſuſpenſo ò laqueari, cùm ipſum quoque ſit horizontale. 3 *Scribit.* fig. 5. Characteres ſingillatim facti è charta, aut ſanè exciſi è charta applicantur ſpeculo, & ſpeculum ſoli, adeò vt lux ſpeculi reflectatur deſtinatum in locum, ibique repræſentet aut figuram lucidam ſimilem ſpeculo, & in ea vmbroſum characterem, aut contra ſolam referat lucidi characteris formam. ſinguli autem characteres alij poſt alios applicantur; & exprimuntur. 4 *Speculatur.* fig. 6. Suſpenditur edito in loco obuerſa in terram, & hoſtes facie, adeò vt quæ in caſtris fiant, aut parentur in foſſis, aperiat tutò iis, qui vultum proferre non auderent. 5 *Nunciat.* fig. 6. De nocte ſuſpenditur edito in loco obuerſa in terram, & aduentans auxilium facie, adeò vt obſeſſi, & aduentantes accenſis facibus alij aliis ſecreta ſignificent, inſcio penitus hoſte. 6 *Metitur.* fig. 7. Vt altitudo ſpectantis AB ad diſtantiam ſpeculi BC: ita altitudo turris DE ad diſtantiam ſpeculi EC, & contra: quare ſi nota ſit altitudo turris, diſtantia cognoſcetur, & contrà ſi nota diſtantia, ſic habebitur altitudo. Si BC 8 pedum verbi gratia, dat BA 5 pedum: CE 48 paſſuum quid? 30. 7 *Pingit.* fig. 8. Dum ſpeculum repræſentat hortum & palatia, vel certè illi obiicitur corpus aliquod plures habens facies, animaduerti poſſunt, & probari leges perſpectiuæ cùm in eo picta videantur obiecta, vt à perſpectiuis præſcribitur, poſſintque filis extenſis deprehendi lineæ, & puncta, & cætera. 8 *Horam nunciat.* fig. 9. Fit in laqueari horologium horizontale, & ad feneſtram diſponitur ſpeculum paruũ immobile, atque illud reflectit errantem toto laqueari ſolis imaginem, quæ horam ſignificet. 9 *Oblata multiplicat.* fig. 10. Eadem candela per ſpeculum vitreum aut cryſtallinum apparet eidem oculo duplex, & triplex. Nempe fit reflexio in prima ſuperficie fig. 11. in puncto A videtúrque in B. Item fit refractio duplex, & vna reflexio. GI frangitur in IC, & fit C reflexio, iterúmque CO frangitur in OL, videtúrque altera candela in E. Item fit refractio duplex, & triplex reflexio fig. 12. GI frangitur in IC, fitque in C reflexio, iterúmque in A, & tertiò in D, ac frangitur DO in OL, videtúrque tertia candela in linea LE. Atque eo pacto fiunt interdum plures reflexiones. 10 *Fucum facit.* Speculum ex vitro colorato aliquid ſui coloris communicat, vt pallidior interdum vultus, interdum rubicundior appareat.

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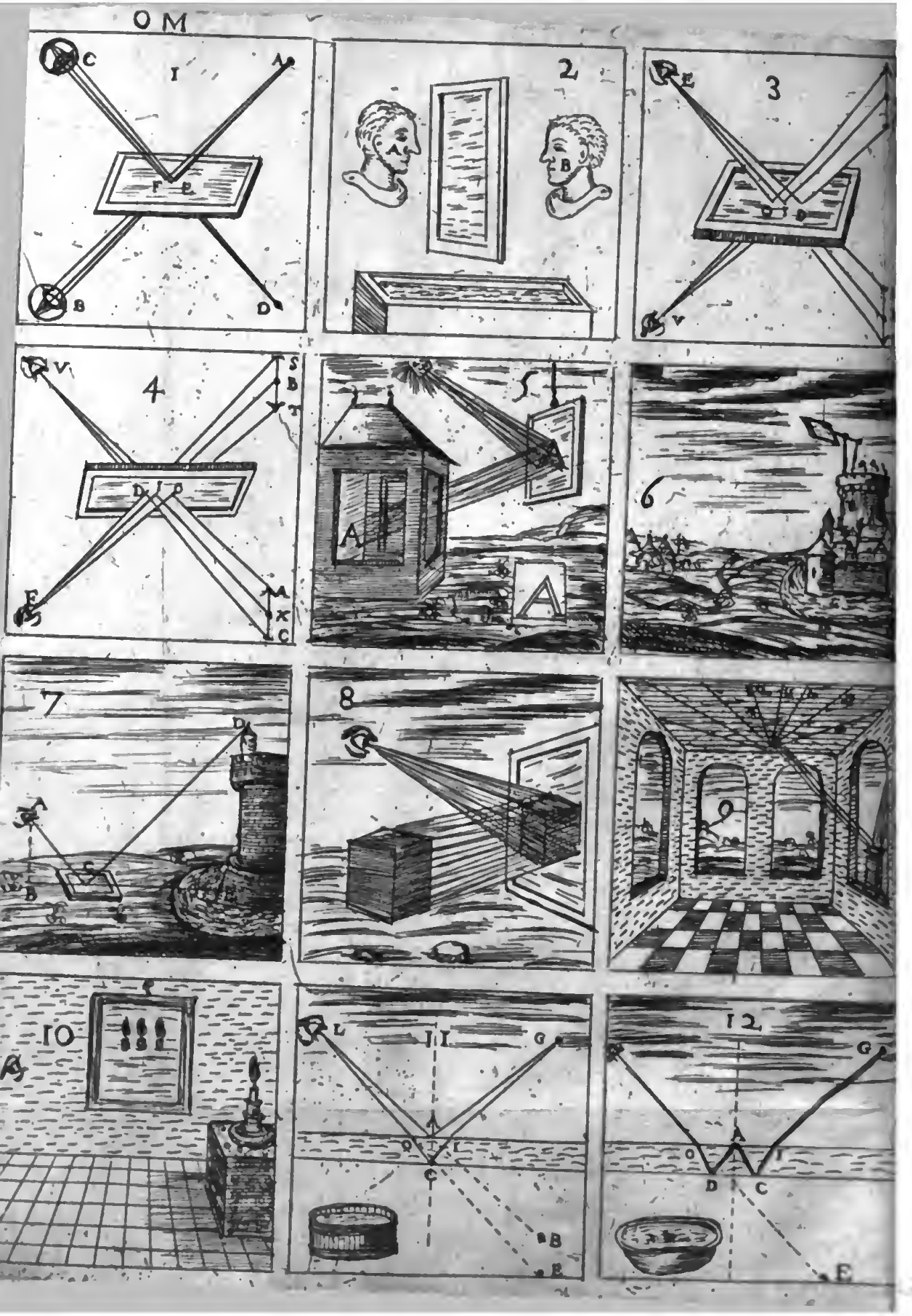
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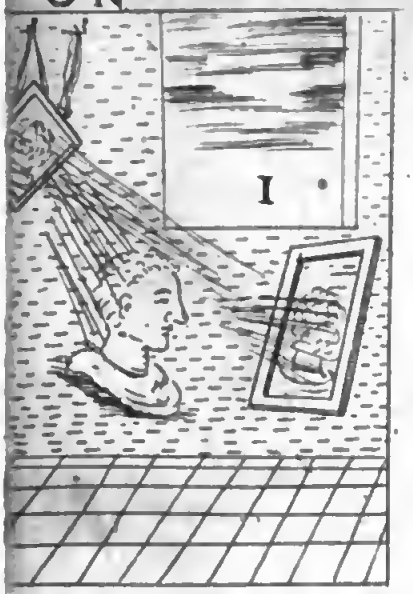
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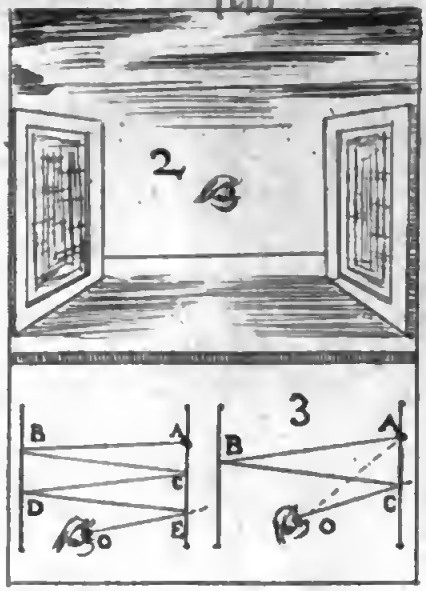
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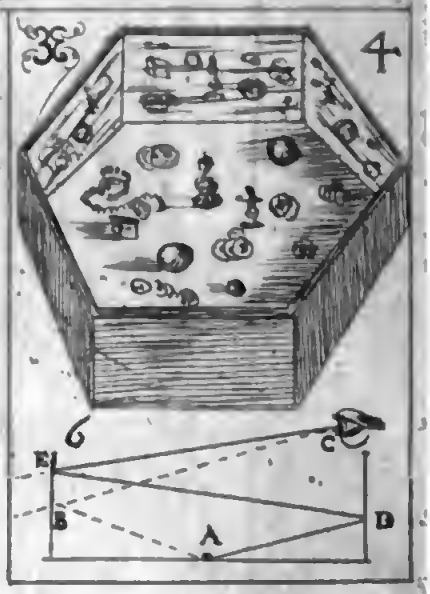
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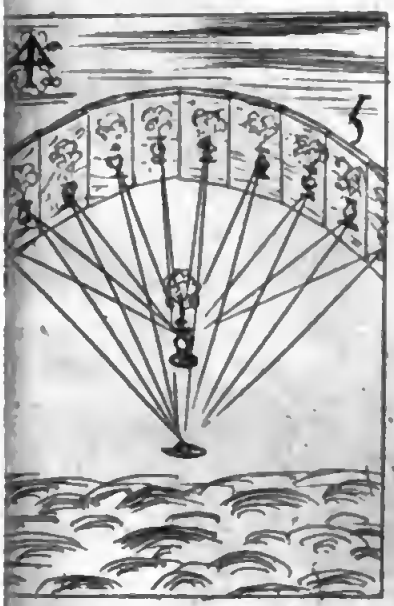
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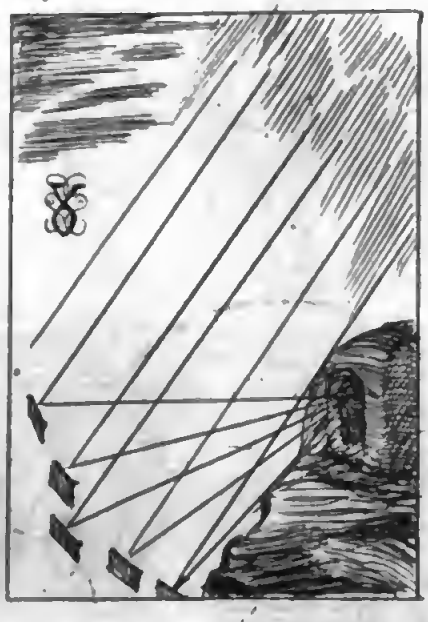
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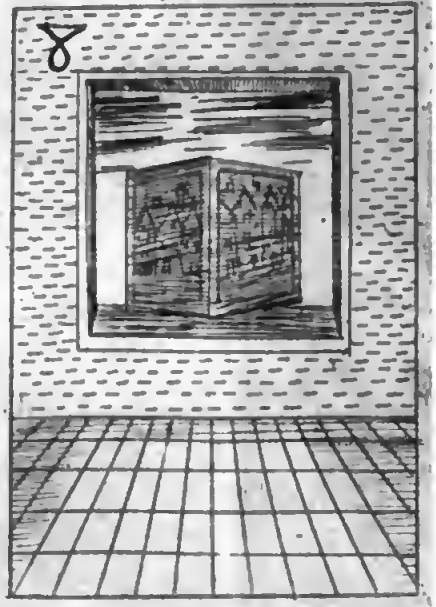
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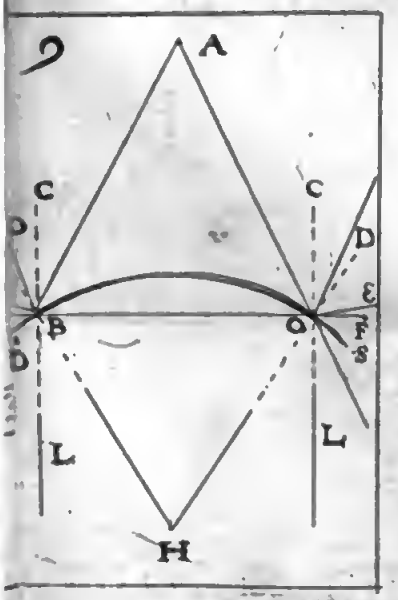
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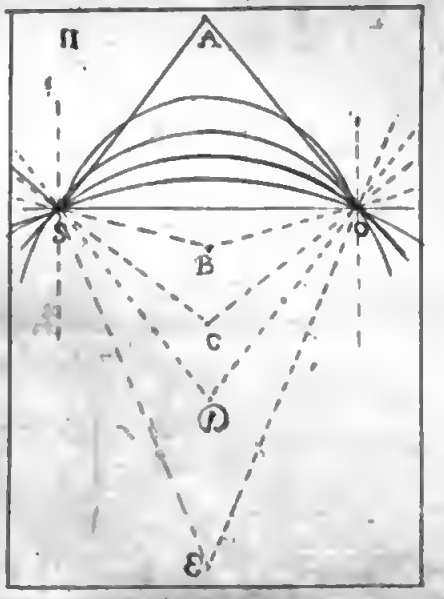
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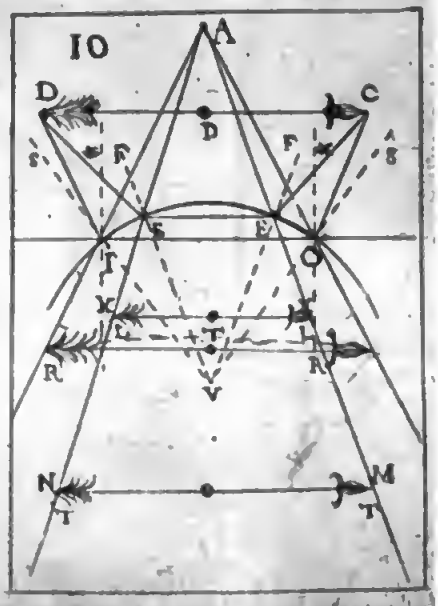
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Possunt ita committi inter se plana specula, vt acceptas obiectorum imagines, mutuò sibi communicent. Hinc præstant quæ sequuntur. 1 *Spectantem sibi ipsum reddunt aspectabilem vndique.* fig. 1. A fertur in B, & resilit in C, & iterùm in oculum. 2 *Mutuum reddunt.* fig. 2. Si opponantur, alterum in altero videbitur pluries, dum, vt fig. 3. quodlibet punctum multiplici reflexione in oculum defertur. A primùm rectà per AO; deinde per AB, BC, CO, & ita per alios reflexos radios, quoad poterunt esse æquales anguli. 3 *Res oblatas multiplicant*, dum vnumquodque rem eandem multoties repræsentat, vt fig. 4. vel multa rem vnam multis in locis exhibent, vt fig. 5. ac primum quidem, vt fig. 6. dum A fertur per AB, & BC, itémque per AD, DE, EF, FC, &c. secundum verò dum, vt fig. 5. singula specula singulas reflectũt imagines. Atque vtroque ex capite ærarium ex nummo, ex milite exercitus, ex columna amphitheatrum, & similia repræsentantur. 4 *Occulta scrutantur & illuminant.* fig. 7. Ita disponuntur, vt exceptos solis radios eundem in locum reflectant, ibique intensum lumen excitent; quidni & incendia? 5 *Quæ foris sunt ad dextram lauámque intus manifestant.* fig. 8. Disponuntur in morem normæ, & extra fenestram posita, vicum repræsentant hinc, & inde, nec tamen in iis spectator se videt.

Sphæricum Speculum conuexum.

1 *Plura detegit, & repræsentat.* fig. 9. Planum speculum sit FOBG, conuexum SOBD. Hæc vtriusque in reflectendo differentia. Signum A fertur in B plani speculi, ac resilit in D, ob perpend. CBL. Idem A fertur in B conuexi, & resilit in E ob perpend. HBD. Ergo vt dilatatur actio eiusdem puncti A; ita viciſſim plura reflectentur in oculum, si ille sit in A, adeò vt radiorum qui per planum feruntur, vltimus sit DB, eorum verò, qui per conuexum, extremus sit EB. Id verò fit, quod perpendiculares conuexi, vt HB, HO recedant à perpendicularibus plani: atque hinc regula. Quo specula sunt portiones minoris sphæræ, hoc plura colligunt, & repræsentant. 2 *Oblata imminuit.* fig. 10. Obiectum CD quod fertur in oculum A per speculum planum sub basi radioſę pyramidis OI, fertur in eundem A per conuexum sub basi minori EE, adeóque videtur sub minori angulo, & ex consequenti minus. 3 *Obiecta repræsentat fortiùs.* Nempe eadem seruata distantia species magis vnit, vnitáſque in oculum reflectit, vt illæ fortiùs agant, perinde ac lumina magis vnita fortiùs illuminant. 4 *Curuitatem suam communicat obiectis,* tum ob sectiones curuas sphæricæ superficiei, tum ob distantias linearum incidentiæ ab oculo, quæ augentur & minuuntur sphæricè. fig. 10. D per E videtur in X: at verò P in T. 5 *Distantias auget.* Nempe, vt obiecta contrahit, ita remouet. fig. 10. CD apparet oculo perinde, ac si remoto speculo esset in MN. 6 *Pingit egregiè*, & rura, palatia, porticus, alióſque prospectus singulari gratia repræsentat. Nempe plura colligit, eáque exhibet vt remota, viuidiùs tamen & fortiùs

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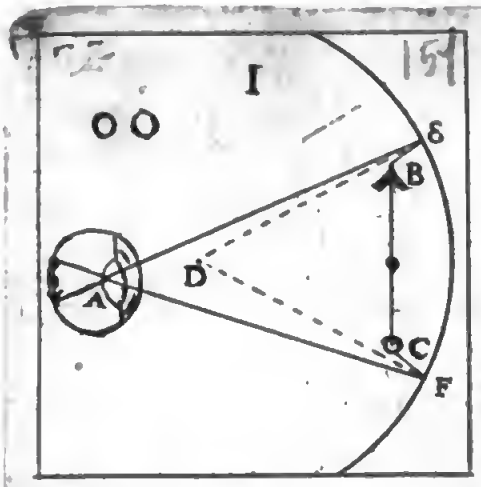
SPECVLVM CONCAVVM SPHÆRICVM.

Speculum cauum duobus modis reflectit obiectum. Si obiectum sit intra centrum speculi, reflexio fit radiis indecussatis. fig. 1. B fertur in E, & resilit in A. item it in F, & in A. At verò si obiectum sit extra centrum, visio fit decussatis radiis fig. 2. B fertur in E redit in A. item C it in F, redit in A, ac sese decussant radii incidentes B E, C F. Hinc varia illius officia.

1 *Erigit & euertit.* Nempe fig. 1 erecta de more apprehendit, cùm visio fiat immutatis radiis: at verò fig. 2 euersa repræsentat, ob radiorum decussationem, & erectam in oculo picturam obiecti. 2 *Confundit.* fig. 3 si oculus sit in centro, tunc, vt vndique reflectitur in seipsum, ita sese videt, toto speculo, & confusè ob confusas in retina species. 3 *Occultat*: fig. 4. si sit obiectum in centro, & oculus alibi, tunc, vt obiectum reflectetur in centrum, adeóque in seipsum, ita ad oculum species non pertinebunt, nec vlla fiet visio. 4 *Polyphemum exhibet*, hoc est intuentem oculum sibi ipsum repræsentat vti monstrum horrendum, ingens, phœbeæ lampadis instar. fig. 5. Magnam retinæ partem imbuit, perinde ac si esset oculus ingens in BC, atque illud quidem ob reflexiones dilatatas propter perpendiculares in centrum concurrentes, quæ, si essent parallelæ, reflexionem contraherent. 5 *Multiplicat.* fig. 6. Quando oculus A est intra centrum, & obiectum B extra, fertur illud per BC, & resilit per CA, itémque per BD, & DA: idémque fit quando oculus est extra centrum, & obiectum intra. fig. 7 B it in C, redit in A. itémque B it in D, redit in A. 6 *Amplificat.* fig. 8 Actionem dilatat, & telum BC tantum pingitur in oculo A, quantum pingeretur maius EF, si esset in EF, nullúmque intercederet speculum, atque adeò cum pictura in oculo augeatur, nec minuatur distantia, æstimatiua obiectum maius apprehendit. 7 *Vnoculum* præstat. hoc est, licèt te duobus oculis intueare in speculo, vnicum tamen tibi esse oculum videbis. fig. 9. Ita disponantur oculi, vt æqualiter à centro D distent; tunc A feretur in C, & B, viciſſimque B in C, & A; adeóque interno in sensu erit vnica tantùm oculi species in medio, aut sanè duæ simillimæ, altera intra alteram. 8 *Longoculum facit.* Hoc est vnicum tibi oculum, sed longiorem, & quasi geminatum exhibet. fig. 10. A it in C, redit in A, videtúrque in C. item B it in D, & A, videtúrque in D. 9 *Trioculum exhibet.* fig. 11 A it in C, & B. pingitúrque in medio, itémque it in D, & redit in A, pingitúrque ad latus, idem facit B, adeóque interno in sensu triplex est pictura, & visio triplex. idem accidit fig. 12 positis oculis extra centrum. 10 *Spectra cudit in aëre.* fig. 13 Ensem si offers strictum, strictum refundet in aëre te inter & speculum. Nempe ob curuitatem speculi ita reflectuntur species in retinam, vt ibi maiorem picturam exhibeant, dum singula puncta in pluribus retinæ partibus pinguntur, eáque ob collectos à speculo radios, viuidius; atque adeò, cùm ita ensis repræsentetur oculo, & æstimatiuæ potentiæ, vt realis ensis maior in aëre existens, eidem repræsentaretur, eadem sequitur apprehensio. 11 Illuminat. 12 Incendit suo loco in vstoriis.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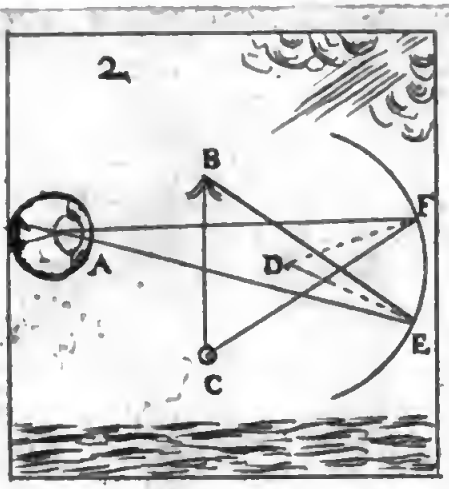
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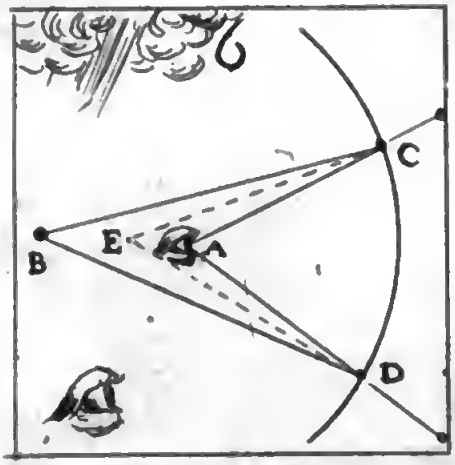
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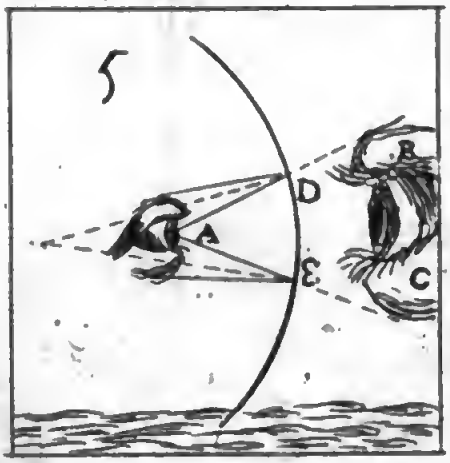
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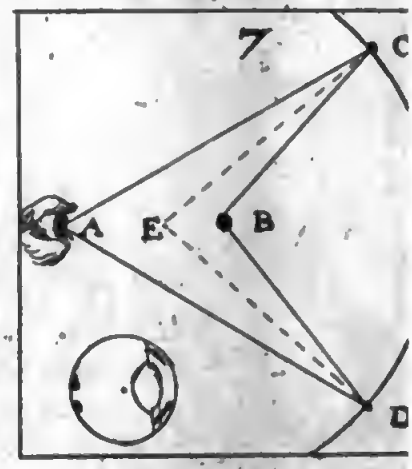
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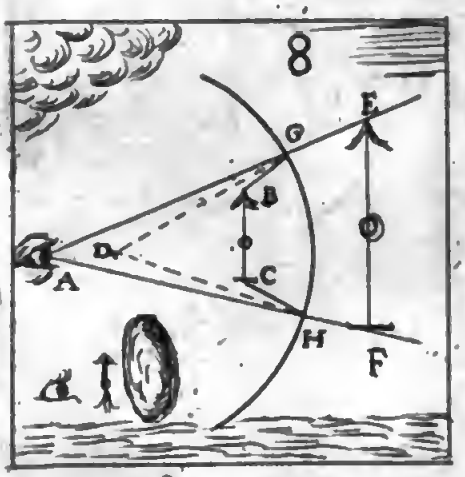
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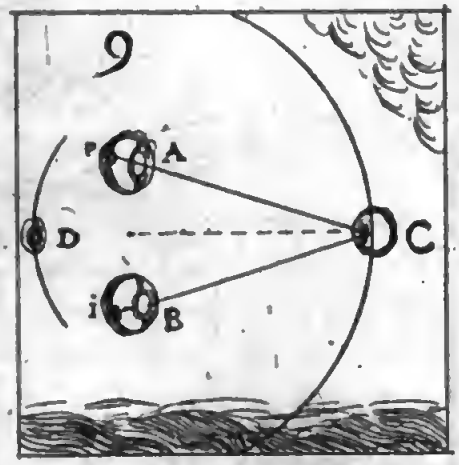
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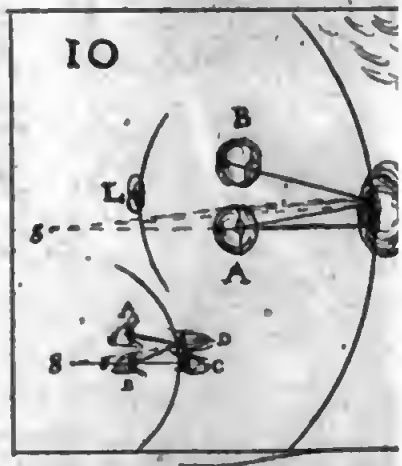
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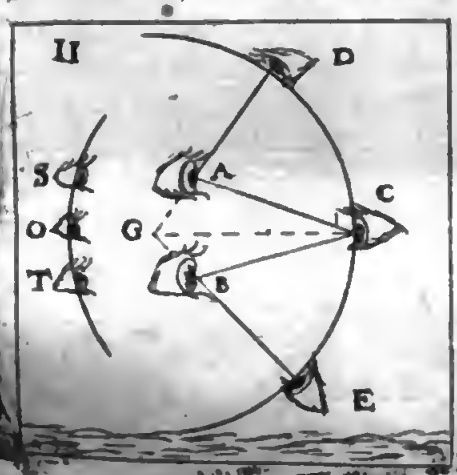
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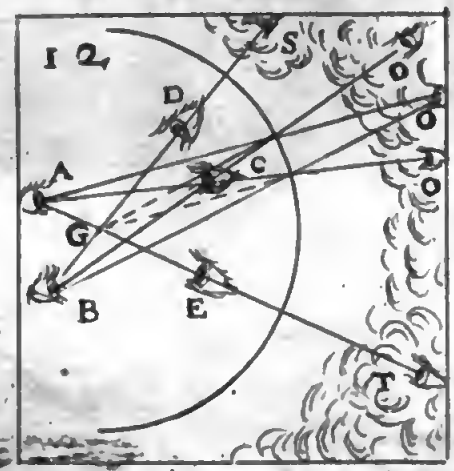
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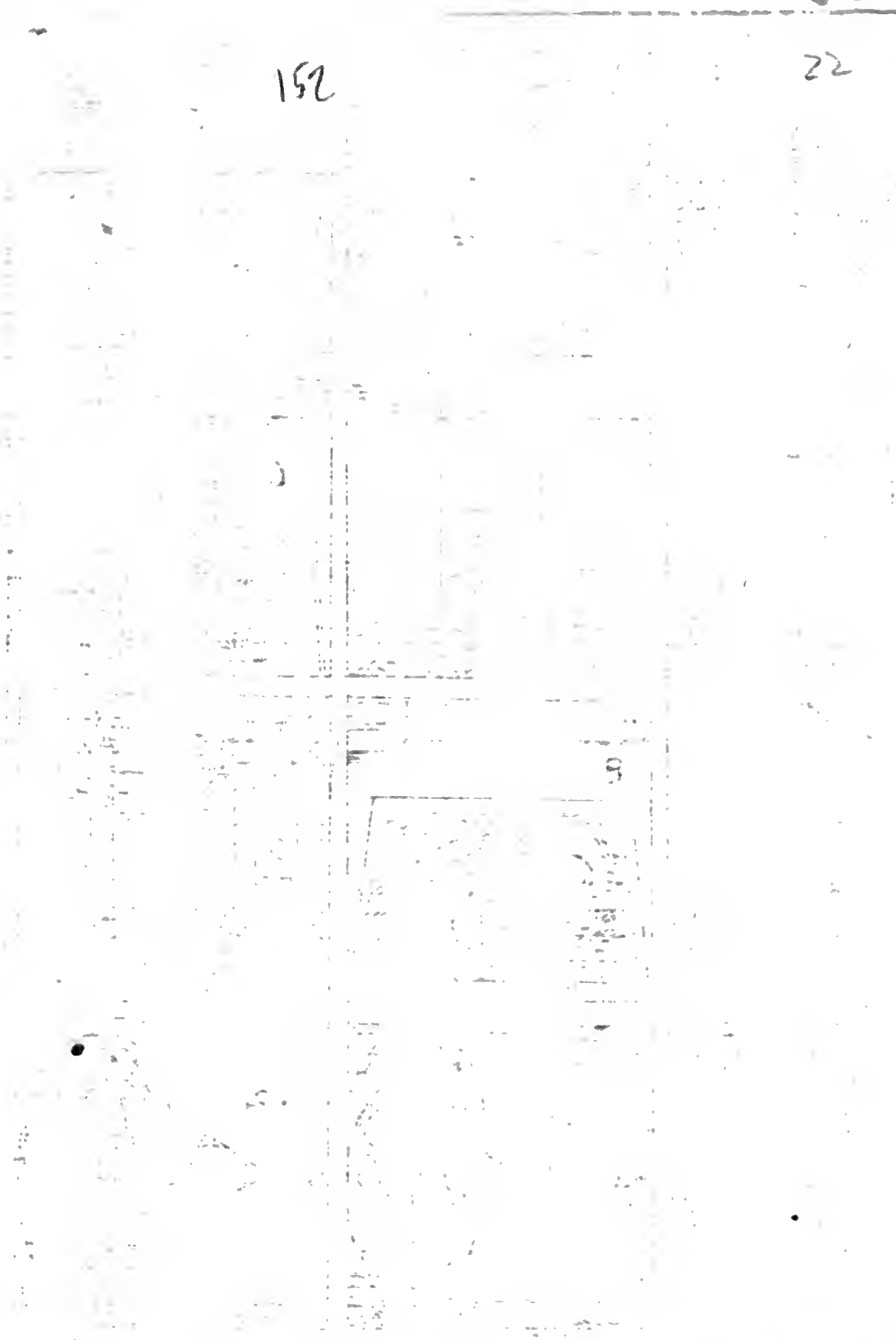

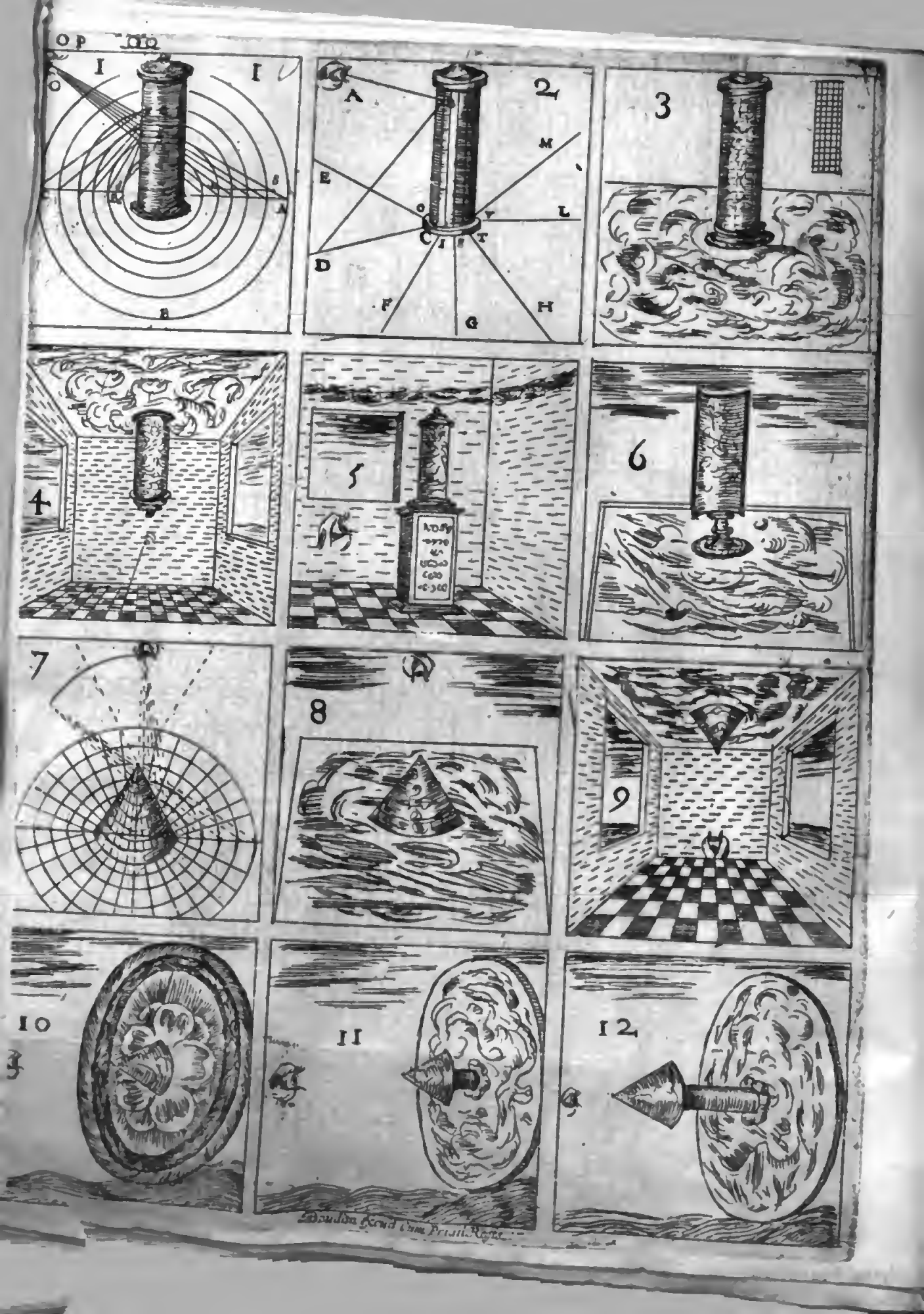
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SPECVLA MIXTA.

Mixta regularia appellantur ea, quæ proprietatibus planorum, & curuorum regulariter communicant. Talia sunt Cylindracea conuexa, quæ secundùm longitudinem spectant ad plana; secundùm latitudinem, aut curuitatem, ad curua: talia quoque sunt Conica, atque omninò ea in quibus reperiuntur lineæ rectæ, & curuæ regulares.

Cylindraceum conuexum. fig. 1. lineas curuas aptè descriptas in plano cui perpendiculariter incumbit, repræsentat vt rectas secundùm latitudinem: curuam C B A vt rectam D E F: ac vicissim lineæ, quæ in eo exhibentur rectæ, & secundùm latitudinem, vt DEF, oriuntur à curuis, vt ABC. Præterea lineas rectas, quæ à centro figuræ prodeunt, repæsentat tanquam perpendiculares secundùm altitudinem. fig. 2: rectam DC, vt perpend. CB: ac mutuò perpendiculares in eo visæ, vt CB, oriuntur à rectis radiis, vt DC. His porro lineis transuersalibus, vt fig. 1, & ascendentibus, vt fig. 2. repræsentantibus in speculo, vt fig. 3, quasi quoddam rete, absoluitur tota praxis imaginum cylindracearum, vt suo loco tradetur, ac demonstrabitur: nunc & vsum speculi, & fontes germanæ demonstrationis digito primùm indicare sit satis. En vsus præcipuos. fig. 3. Speculum imponitur horizontali plano superiori, & colligit ex confusis in speciem coloribus imaginem perfectam. Idem præstat cùm ex laqueari, aut horizontali inferiori pendet. fig. 4. Ad hæc fig. 5. medio in conclaui ita statuitur aut supra stylobatam, aut pendulum ex vmbone, vt imaginem perfectam conficiat ex limbo colorato circa conclaue vix aduertentibus spectatoribus vnde spectrum oriatur. En fontem. fig. 1. C fertur in F, resilit in O, apparet in S. Item R it H reflectitur in O, videtur in L, adeóque recta RC apparet in SL, & cæteræ. Quia verò S videtur per superiorem radium, quàm L, & quia S, siue C & F pinguntur eadem in parte retinæ, & S quidem viuidius, æstimatiua potentia apprehendit F eleuatum supra H; nec non S parum distans ab F, adeóque eleuatum supra L, eóque pacto referens imaginem apparentem ad speculum visum, eam non vt iacentem, sed, vt erectam apprehendit. *Cylindraceum concauum.* Eadem patitur, & agit. Hoc peculiare: dextras figuræ partes transfert in sinistras, & contrà. fig. 6.

Speculum Conicum conuexum. figura septima. Radios à centro figuræ exeuntes exhibet quasi semidiametros; & circulos extra se concentricos, tanquam circulos intra se concentricos, ita tamen, vt interiores repræsententur ab exterioribus, ac veluti quoddam rete videatur in speculo ad describendas imagines, vt pluribus in praxi. En vsus. fig. 8 supra planum statuitur, & ex coloribus plani imaginem colligit miris modis. Idem præstat suspensum è laqueari fig. 9. Præterea medio in clypeo ad instar vmbonis collocatur, & ex limbo, vel corona imaginem legit. fig. 10. Ad hæc plus, aut minus eleuatur supra planum, ac diuersas colligit imagines prout plus aut minus eleuatur. fig. 11 & 12, ac latent aliæ, dum aliæ apparent.

1614

Reuerendo in xpō pri P. Athanasio
Kirker Societatis Jesu.

1. 2. Oculus ſua in ſede poſitus, ac munitus palpebris. Partes in eo apparentes ſunt Album, Iris, Pupilla.

3. Oculus auulſus è capite ſuis cum muſculis, & membranis. EB Adnata, ſiue membrana oculum vinciens. AO pars oculi viſa. P non viſa. A Iris, ſiue oculi fuſcum, cuius media pars quaſi nigra Pupilla eſt. O Album oculi. R Neruus opticus. V Muſculi oculum mouentes. 4. Anterior pars oculi. A Iris. O Album. E Adnata. I foramina lacrymarum. 5. Oculus depoſita adnata, & muſculis. AOR Sclerotica tunica extima, ſiue Sclerodes, aut Conſolidatiua, aut Craſſa. R Nerui optici extima tunica, & durior, & à dura cerebri matre proficiſcens.

6. Diſſectus oculus per iridem, & neruum. E Sectiones, aut partes factæ per diſſectionem, vt in iis ordo interiorum partium obſeruetur, vt in ſequēti.

7. Sectio oculi. Ex tribus tunicis, quæ interiorem oculi ſinum conueſtiunt, extima Sclerotica eſt; media Choroides, intima Retina, ſiue Retiformis, aut fundum oculi. A Cornea, vel pars anterior Scleroticæ tranſparens ad inſtar cornu. D Vuea, vel pars anterior Choroidis perforata. B Pupilla, ſiue foramen Vueæ. C Cryſtallinus humor, aut glacialis incluſus tunica, & ſuſpenſus ante pupillam. E Proceſſus ciliares, aut reductus tunicarum Cryſtallinum ſuſpendens, ac librans. DBD Aqueus humor, & in eo natans Vuea. EFE Vitreus humor ſinum oculi complens.

8. Choroides apparens Sclerotica depoſita. A Vuea. R Nerui optici media tunica, mollior, & à cerebri pia matre orta. 9. Retina apparens depoſitis Sclerotica, & Choroide, eáque non omninò orbicularis, vt quæ tantùm pertineat ad Proceſſus. R Nerui optici ſubſtantia à cerebro ipſo proficiſcens, ac ſeſe dum expandit in morem calicis, Retinam conſtituens factam ex neruis minutiſſimis, vt ipſe quoque ex neruis minutiſſimis ad inſtar cæterorum componitur. 10. Sola vuea perforata, & foramen illius Pupilla. 11. Cryſtallinus ſpectatus à latere, ac gibboſior interiori facie. 12. Idem ſpectatus à fronte, ſimúlque vtrobique tunica illum conueſtiens Cryſtalloides, vel Arachnoides, cùm ille quoque Aranea vocetur, quòd filis Proceſſuum inſtar Aranei ſuſpenſus libretur. 13. Interior facies Proceſſuum ciliarium. 14. Eorumdem facies interior ad inſtar annuli ferrei plani, ſimúlque vtrobique in medio ſuſpenſus Cryſtallinus. 15. Forma vitrei humoris, adeóque & tunicæ peculiaris, quæ includitur, quæque vocatur Hyaloides, cuius ſinus anteriori in parte Cryſtallinum fouet. 16. Forma humoris aquei, & in eo natantis Vueæ locus. 17. Vitreus humor, & Cryſtallinus filis libratus.

Tunicæ omninò 7. Partiales 4, Sclerotica, & Cornea, Choroides, & Vuea: Totales 3, Retina, Cryſtalloides, & Hyaloides. Humores 3, Aqueus denſus vt aqua; Vitreus, vt vitrum; Cryſtallinus, vt Cryſtallus. Sclerotica, Choroides, & Vuea opacæ: cæteræ tranſparentes.

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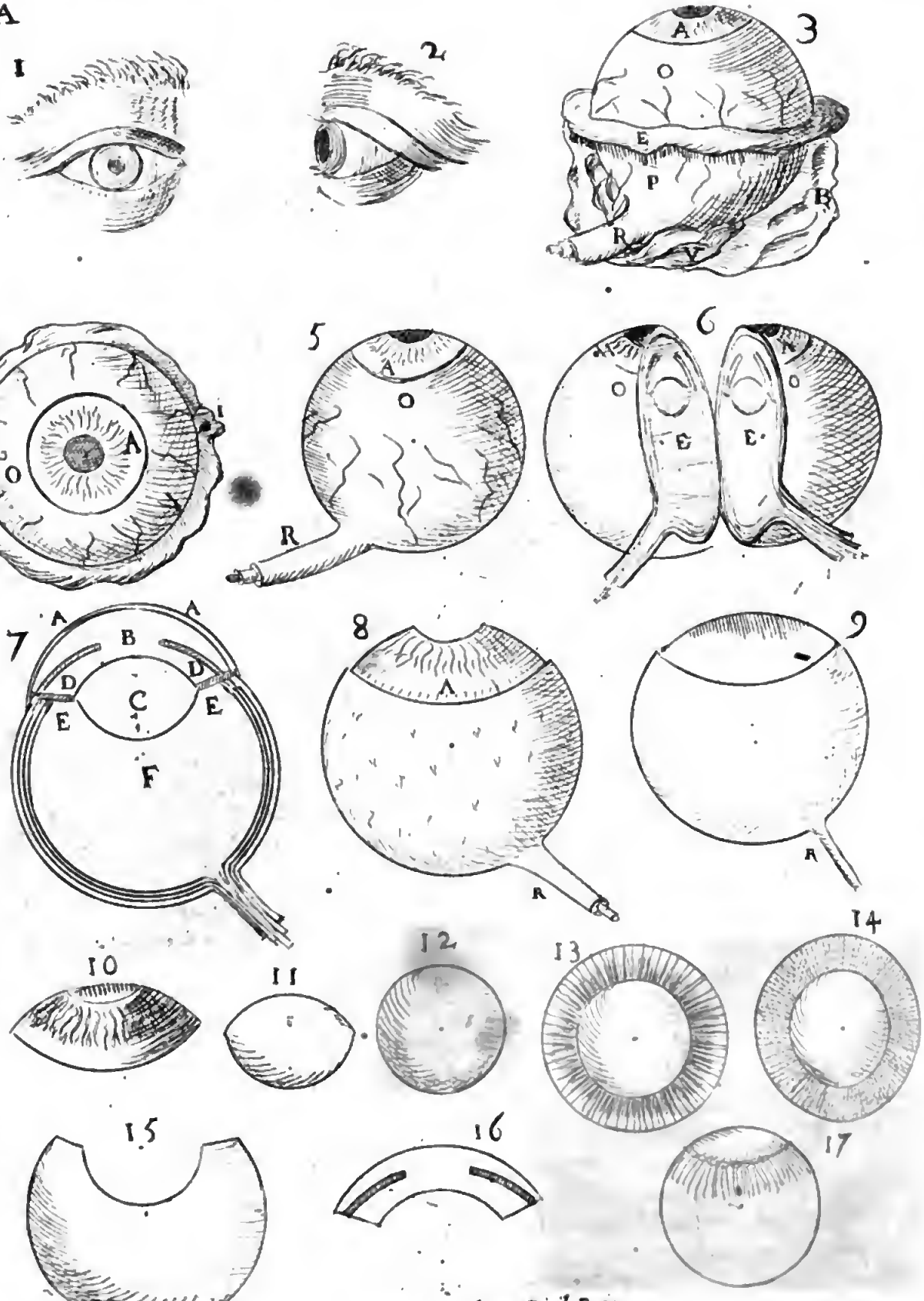

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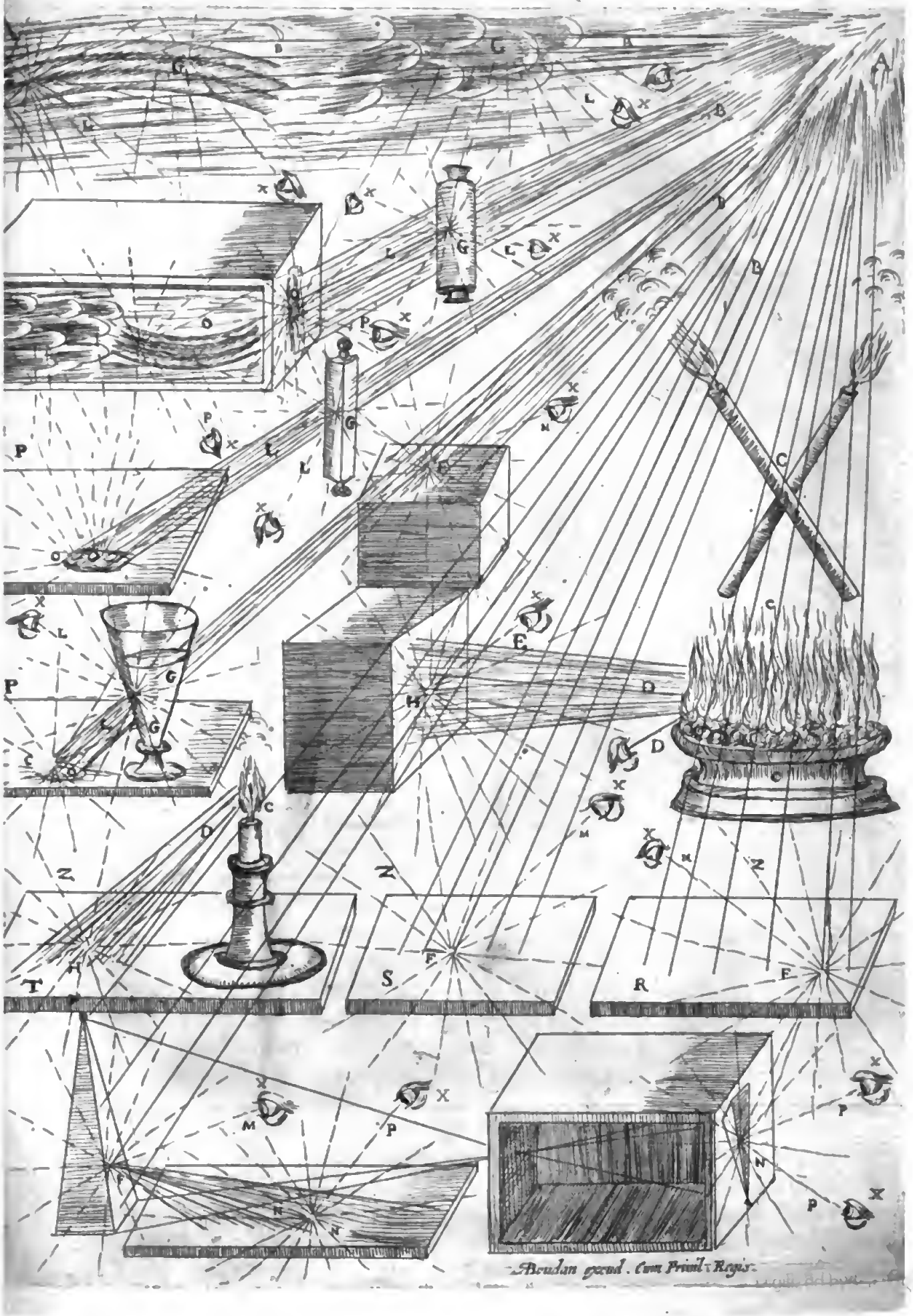
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O. CVLI FECVNDITAS. OB.

Fecundant oculum lux, & color per lumen, & ſpeciem.

Phænomena. A Lux ſolis pura. B Radius illi ſimilis. C Lux facis, aut accenſæ materiæ coloratæ. D Radius illi ſimilis. F Illuminatum à ſole corpus opacum. M radius illius. H illuminatum à face Opacum. E radius illius. G illuminatum à ſole Perſpicuum coloratum. L radius illius. O, N Effectus ſecundarius. P radius illius. R,S,T Corpora purpurea. Z varij illorum radii. X Oculi iſta intuentes, dum eorum imaginibus fecundantur.

Definitiones. 1. Lux eſt qualitas in Luminoſo, eáque varia aut colorata pro varia luminoſi natura, aut colore. A, C. 2. Color eſt qualitas in Colorato apta ad terminandum, ſiue retinendum lumen, aut ſpeciem. 3. Lumen eſt potentialis, aut actualis imago Luminoſi; ſiue qualitas procedens à Luminoſo, & in Perſpicuo recepta, eáque ibi inefficax B, D, niſi colore terminetur; terminata verò F, G, H fit actualis imago Luminoſi, & cum colore terminante conſtituit Illuminatiuum. 4. Illuminatiuum F, G, H eſt compoſitum aliquod ex colore & lumine conſtitutum producens ſpeciem. 5. Species eſt potentialis, aut actualis imago Illuminatiui, ſiue qualitas ab eo procedens, & in Perſpicuo recepta, eáque ibi inefficax M,E, niſi colore terminetur: terminata verò fit actualis imago Illuminatiui, & cum colore terminante conſtituit Illuminatiuum ſecundarium, quod eſt quoque Compoſitum ex ſpecie & colore, ac producit ſpeciem ſecundariam, vt fiat ex illa, & colore terminante aliud, atque aliud Illuminatiuum ſecundarium, quoad ſphæra actiuitatis terminetur. 6. Perſpicuum eſt corpus ſenſibiliter coloris expers, adeóque nihil ſiſtens luminis, aut ſpeciei, vt aër purus. Opacum verò corpus ita coloratum, vt retineat omninò intra ſe lumen, aut ſpeciem, vt marmor ſpiſſum. Perſpicuum denique ex parte, quod plus aut minus habet coloris ſiue intenſiuè, ſiue extenſiuè, adeóque ſiſtens partem luminis, aut ſpeciei, partem non ſiſtens, vt Vitrum.

Canones. 1. Illuminatiuum quodlibet fit tale ex tali lumine, vel ſpecie, tali colore, & tali luminis, aut ſpeciei applicatione ſub tali aut tali angulo. 2. Illuminatiua fiunt diuerſa tum ab eodem lumine, & diuerſis coloribus, tum ab eodem colore, & diuerſis luminibus, tum denique ab eodem colore, & lumine, ſed diuerſa luminis applicatione: idémque de ſpecie cenſendum. 3. Eadem, aut ſimilis imago in oculo, vt purpuræ, produci poteſt à diuerſis illuminatiuis, ſiue diuerſis principiis diuerſo modo inter ſe cõpoſitis. 4. Quando lumina, & ſpecies variæ ſimul terminantur colore aliquo, tunc fit ex iis omnibus Illuminatiuum illi magis ſimile, quod fortius eſt, & quod ex iis fortius eſt, longiùs agit, ac ſæpè cæterorum imaginem ita delet, vt illa, niſi amoto fortiori, non appareat: His porrò explicantur facilè ſuperiora phænomena, aliáque id genus, quæ fiunt per reflexionem, refractionem, & mediorum diuerſitatem, vt ſuo loco, Deo dante demonſtrabimus.

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